

# **American H Block Wireless L.L.C. Interim Construction Notification for H Block Licenses**

**May 14, 2018**

## **I. INTRODUCTION AND SUMMARY**

Pursuant to 27.14(k) of the Commission’s rules, American H Block Wireless L.L.C., an indirect, wholly-owned subsidiary of DISH Network Corporation (together, “DISH,” the “company,” or “we/us”), files this Interim Construction Notification for DISH’s spectrum licenses in the Advanced Wireless Service (“AWS”) H Block (1915-1920 MHz UL / 1995-2000 MHz DL) (the “H Block licenses”).<sup>1</sup> As explained below, DISH continues to progress in its plans to become a connectivity company by deploying a next-generation network, initially focused on supporting the Internet of Things (“IoT”), with upgrades to 5G to follow. DISH anticipates meeting the applicable final coverage and service construction milestone for the H Block licenses by March 2020. Under this projected timing, DISH expects to deploy service using the H Block licenses two years earlier than required by the otherwise applicable final buildout deadline (which is April 2022).

Among other things, as reported in March 2017,<sup>2</sup> DISH plans to deploy the H Block to support its next-generation network in two phases. In Phase 1, DISH will deploy a narrowband IoT (“NB-IoT”) network using its AWS-4, 700 MHz E Block, and H Block licenses. This NB-IoT network represents a bridge to full 5G, given that standalone 5G standardization and equipment/installation availability will be realized after the applicable March 2020 buildout deadline for the AWS-4 and 700 MHz E Block licenses, making it impractical for DISH to deploy 5G before such deadline.

For its NB-IoT network, DISH has already entered into contracts with dozens of vendors for base stations, chipsets, devices, towers, core network, and other key inputs, and DISH’s

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<sup>1</sup> In addition to DISH’s AWS-4 (2000-2020 MHz, 2180-2200 MHz) and Lower 700 MHz E Block (722-728 MHz) licenses, the H Block licenses represent an important asset to support DISH’s overall wireless strategy. DISH successfully bid for all 176 wireless spectrum licenses in the H Block auction, and paid \$1.672 billion to acquire these licenses, including clearing costs associated with the lower H Block spectrum. On April 29, 2014, the FCC issued an order granting DISH’s application to acquire the H Block licenses. *See* Wireless Telecommunications Bureau Grants H Block (1915-1920 MHz and 1995-2000 MHz) Licenses, *Public Notice*, 29 FCC Rcd. 4782 (2014).

<sup>2</sup> DBSD Services Limited, Gamma Acquisition L.L.C., and Manifest Wireless L.L.C.’s Consolidated Interim Construction Notification for AWS-4 and Lower 700 MHz E Block Licenses, ULS Lead File No. 0007690535 (Mar. 7, 2017) (“March 2017 Report”).

engineering and deployment teams have been working with vendors on technical and operational milestones. Among other things, radio frequency (“RF”) design for the Phase 1 network should be completed in the second quarter of 2018. We expect the core network will be commissioned and installed this summer. Based on what our vendors have indicated, we expect to take delivery of radios in the fall of this year, and we are in the process of identifying and acquiring tower sites. We plan to install the first radios on towers in an initial wave of markets by the end of this year. Deployment will continue in 2019.

In Phase 2, which we expect will follow as standalone 5G is standardized and as DISH’s plans for its other spectrum holdings develop (including the clearing of the 600 MHz licenses), we plan to upgrade and expand our network to full 5G to support new use cases in addition to mobile broadband services. We believe that this approach will accommodate new partnerships and sharing models, including the potential to serve as a highly secure open source or neutral host to support industry verticals. As our wireless plans progress, we may file updates with the Commission.

## **II. THE WIRELESS INDUSTRY IS INVESTING IN NEXT-GENERATION 5G AND IoT SERVICES, INCLUDING NB-IoT**

### **A. The Paradigm Shift to 5G and IoT**

The forthcoming 5G evolution represents a paradigm shift to a new era of communications and connectivity. 5G will meet the increasing demand for broadband communications by offering dramatically higher data speeds and capacity, while also addressing the needs of a networked society by enabling massive connectivity and ultra-low latency for mission critical services. 5G will usher in a new era of economic growth and innovation by connecting billions of new consumer and industrial devices. Over the next two years, standards work will continue to implement the global vision and timelines for 5G. Full standalone 5G standardization is expected to be complete by December 2019,<sup>3</sup> with trials ongoing this year.<sup>4</sup>

With 5G on the horizon, widespread deployment of IoT is already a reality, and the trend will only accelerate as DISH moves forward with its buildout plans. In 2017, a Government

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<sup>3</sup> See “Release 16,” 3GPP, *available at* <http://www.3gpp.org/release-16> (last accessed May 3, 2018).

<sup>4</sup> See Monica Allevan, “Verizon CEO: 5G Trials Going ‘Extremely Well,’ with Expectations to Deliver 1 Gbps,” FierceWireless (Jan. 23, 2018), *available at* <https://www.fiercewireless.com/wireless/verizon-ceo-5g-trials-going-extremely-well-expectations-to-deliver-1-gbps>.

Accountability Office (“GAO”) report noted that “[t]he number of connected devices—ranging from goods like phones and cameras to connected vehicles to automated manufacturing facilities—is currently estimated in the billions and rising.”<sup>5</sup> Devices connected to IoT networks are being “integrated into the daily activities of consumers, businesses, and government,”<sup>6</sup> and applications range from health to agriculture to monitoring traffic flow and air quality.<sup>7</sup> The White House has similarly recognized the growing significance of 5G and IoT to our national economy, including by seeking input from industry leaders on connectivity opportunities and challenges.<sup>8</sup> Chairman Pai has made similar predictions, noting that “[w]ith billions more connected devices, ranging from your car to your appliances, the Internet of Things will impact everything from supply chains to worker productivity,”<sup>9</sup> and has “the potential to create trillions of dollars in economic value over the next decade.”<sup>10</sup>

Consistent with these projections, DISH is joining with the broader wireless industry in investing in new IoT products and services. Like DISH, incumbent carriers are increasingly expanding their vision for the future of networks that will power billions of different products across all industries. IoT offers a broad opportunity for wireless industry growth, and the characteristics of NB-IoT technology in particular will offer distinct advantages in, among other things, lower power consumption of user devices<sup>11</sup> and the ability to support many more devices per individual tower compared to 4G/LTE broadband.

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<sup>5</sup> United States Government Accountability Office Report to Congressional Requesters, *Internet of Things: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*, GAO-18-71, at 1 (Nov. 2017), available at <https://www.gao.gov/assets/690/688450.pdf> (“GAO IoT Report”).

<sup>6</sup> *Id.*

<sup>7</sup> *Id.*

<sup>8</sup> See Report from the Executive Office of the President of the United States, *Science & Technology Highlights in the First Year of the Trump Administration*, at 5 (Mar. 2018) available at <https://www.whitehouse.gov/wp-content/uploads/2018/03/Science-and-Technology-Highlights-Report-from-the-1st-Year-of-the-Trump-Administration.pdf>.

<sup>9</sup> Ajit Pai, “Another View – Ajit Pai: Tech Week: How the U.S. Can Win the Digital Future,” New Hampshire Union Leader (Jun. 21, 2017), available at <http://www.unionleader.com/Another-View-Ajit-Pai-Tech-Week-How-the-US-can-win-the-digital-future-06222017>.

<sup>10</sup> *Id.*

<sup>11</sup> Zacks Equity Research, “Are LTE Cat-M and NB-IoT the Next Big Things in Wireless?,” Nasdaq (Oct. 2, 2017), available at <https://www.nasdaq.com/article/are-lte-cat-m-and-nb-iot-the-next-big-things-in-wireless-cm853820>.

Indeed, several large wireless industry players are investing in NB-IoT:

- In January 2018, T-Mobile announced “the nation’s first plan for narrowband IoT” which will “take [] advantage of narrowband technology ... to significantly lower the costs of connecting things and unleash the next wave of IoT innovation.”<sup>12</sup>
- In early 2018, Vodafone announced the launch of an NB-IoT network in Germany to attract new enterprise customers. Vodafone Germany’s CEO hailed IoT as “the next chapter in the German digital transformation,” and predicts it will power “smart factories, smart clothes and smart cities.”<sup>13</sup>
- Deutsche Telekom is making forays into NB-IoT, with a smart parking system deployed in Hamburg.<sup>14</sup>
- China has been actively driving the development of NB-IoT, with all three major mobile operators investing heavily in NB-IoT networks.<sup>15</sup>
- At Mobile World Congress 2018, Cisco announced that its Jasper Control Center for NB-IoT platform is now available globally through service provider partners in Australia and Singapore. Cisco reportedly expects NB-IoT to lead “astronomical” growth in the IoT ecosystem.<sup>16</sup>

Like others, DISH sees its NB-IoT network as filling a growing demand for device connectivity in the near term, and as serving as a stepping stone to full 5G in the network’s second phase.

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<sup>12</sup> “T-Mobile Launches Nation’s First Plan for Narrowband IoT,” T-Mobile Newsroom (Jan. 9, 2018), available at <https://newsroom.t-mobile.com/news-and-blogs/narrowband-iot.htm>.

<sup>13</sup> “Vodafone Germany to Take on Deutsche Telekom with NB-IoT Launch,” Mobile Europe (Feb. 23, 2018), available at <https://www.mobileeurope.co.uk/press-wire/vodafone-germany-to-take-on-deutsche-telekom-with-nb-iot-launch>.

<sup>14</sup> See “Deutsche Telekom to Bolster Hamburg Parking Network with NB-IoT,” Mobile Europe (Jan. 29, 2018), available at <https://www.mobileeurope.co.uk/press-wire/deutsche-telekom-to-bolster-hamburg-parking-network-with-nb-iot>.

<sup>15</sup> See “China will Lead the World in NB-IoT, Which Will Benefit Chinese Vendors and the Ecosystem Worldwide,” Analysys Mason (Jan. 18, 2018), available at <http://www.analysysmason.com/Research/Content/Comments/China-IoT-benefits-RDME0-RDRP0/>.

<sup>16</sup> Teena Maddox, “Cisco Launches New Narrow Bandwidth IoT Platform to Power Astronomical NB-IoT Growth,” TechRepublic (Feb. 26, 2018), available at <https://www.techrepublic.com/article/cisco-launches-new-narrow-bandwidth-iot-platform-to-power-astronomical-nb-iot-growth/>.

**B. DISH Plans to Deploy a Next-Generation Network Focused on 5G and IoT in Two Phases Using the H Block Licenses and Other Licensed Spectrum**

DISH, like other operators, views NB-IoT as a “pathway to 5G IoT.”<sup>17</sup> NB-IoT is recognized as “the global wide area IoT network of choice,” with the “pace of development ha[ving] skyrocketed over the past year[.]”<sup>18</sup> Phase 1 of our deployment will focus on NB-IoT, which was standardized in June 2016 as part of 3GPP Release 13.<sup>19</sup> That focus is due to a number of factors. As we explained in March 2017, we do not believe that it serves the public interest or makes business sense to build out a 4G/LTE network now that would duplicate networks already offered by the wireless incumbents, and would subsequently require an almost immediate upgrade in order to be competitive.<sup>20</sup> Instead, DISH plans to deploy a network initially focused on supporting IoT – the first to be deployed in our licensed spectrum bands anywhere in the world.

We envision an advanced network that can accommodate the increasing proliferation of IoT devices and services, with the objectives of providing low cost, extended coverage, long battery life, and increased connectivity solutions to the market. We believe that this approach will accommodate new partnerships and sharing models, including the potential to serve as a highly secure open source or neutral host to support industry verticals, including but not limited to logistics, cloud applications, healthcare, agriculture, and other connectivity use cases. The H Block, 700 MHz E Block, and AWS-4 licenses will be activated to support Phase 1. We are also exploring ways to distinguish our NB-IoT network from others, including through augmenting connectivity with our Mobile-Satellite Service (“MSS”) satellites that can operate in the AWS-4 frequencies. In Phase 2, which we expect will follow as standalone 5G is standardized, and as DISH’s plans for its other spectrum holdings develop, we plan to upgrade our network to full 5G to support new use cases in addition to mobile broadband services. We believe we can

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<sup>17</sup> “T-Mobile Launches Nation’s First Plan for Narrowband IoT,” T-Mobile Newsroom (Jan. 9, 2018), available at <https://newsroom.t-mobile.com/news-and-blogs/narrowband-iot.htm>.

<sup>18</sup> “NB-IoT Ignites the Race to a Billion LPWA Connected Devices by 2025,” IoT Business News (Mar. 14, 2018), available at <https://iotbusinessnews.com/2018/03/14/20954-nb-iot-ignites-the-race-to-a-billion-lpwa-connected-devices-by-2025/>.

<sup>19</sup> See “Standardization of NB-IOT Completed,” 3GPP (Jun. 22, 2016), available at [http://www.3gpp.org/news-events/3gpp-news/1785-nb\\_iot\\_complete](http://www.3gpp.org/news-events/3gpp-news/1785-nb_iot_complete).

<sup>20</sup> See March 2017 Report at 4.

distinguish ourselves because we will not be burdened by servicing a legacy cellular network.

As Commissioner Carr noted recently:

Europe won the race to 2G in large part because other parts of the world, including the U.S., failed to move quickly enough to modernize our regulatory frameworks. For example, the FCC required that carriers continue to support their analog 1G networks long after Europe dropped that requirement. By requiring carriers to maintain essentially two networks, our outdated regulations drained capital and resulted in less efficient spectrum use.<sup>21</sup>

We agree. As a nascent wireless competitor, we are focused on deploying capital to build an innovative 5G network to meet the needs of consumers and industry.

We also expect that our 600 MHz spectrum assets will play an important role in our 5G future. But, among other frequency coordination issues, those licenses will not be fully cleared of TV broadcasters until at least July 2020, which is after the AWS-4 and 700 MHz E Block buildout deadline of March 2020. We want to deploy our 5G network with the spectrum best suited to 5G's capabilities, including our 600 MHz licenses. In light of the March 2020 deadline, balanced against the timeline for relevant standard-setting and the clearing of 600 MHz, DISH believes its plan to roll out its network with current NB-IoT technology, with future upgrades to 5G, is the most logical and prudent path.

Under our projected timeline, the H Block licenses will be deployed consistent with the applicable buildout requirement. Under the Commission's rules, DISH has two buildout paths for its H Block licenses: meet an interim milestone in April 2018 and a final milestone in April 2024; or, meet an accelerated final milestone by April 2022.<sup>22</sup> Pursuant to Section 27.14(k), DISH certifies that it is pursuing the latter path.

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<sup>21</sup> Remarks of Commissioner Brendan Carr, "Next Steps on the Path to 5G," CTIA's Race to 5G Summit, at 2 (Apr. 19, 2018), available at [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-350348A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-350348A1.pdf).

<sup>22</sup> Pursuant to Section 27.14(r)(1)-(2), an H Block licensee shall provide signal coverage and offer service to at least forty percent of the population in each of its licensed areas by April 29, 2018 (the "H Block Interim Milestone"), and to at least seventy-five percent of the population in each of its licensed areas by April 29, 2024 (the "H Block Final Milestone"). See Service Rules for Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands, *Report and Order*, WT Docket No. 12-357, 28 FCC Rcd. 9483, 9558 ¶ 195 (2013) ("*H Block Report and Order*"). If an H Block licensee does not meet the H Block Interim Milestone, the H Block Final Milestone is accelerated by two years, meaning the H Block Final Milestone must be met by April 29, 2022 (the "Accelerated H Block Final Milestone"). See *id.*; 47 C.F.R. § 27.14(r)(3).

DISH's plans for its network, and for the H Block licenses in particular, have evolved since acquiring the licenses at auction in 2014. In winning a nationwide footprint for the H Block, DISH believed that, as the holder of adjacent AWS-4 spectrum, it would have the incentive and technical ability to make better use of both of those spectrum bands in a coordinated way. This was, among other things, due to certain impairments (further discussed in Section IV) to operations in the lower AWS-4 segment (2000-2020 MHz) that resulted from service rules the FCC adopted for the H Block.<sup>23</sup>

DISH's efforts to standardize the H Block were initiated in late 2014. We began by studying how the newly acquired H Block and the lower AWS-4 spectrum (2000-2020 MHz) could be standardized as a 3GPP band. We explored a number of options for potential introduction and standardization by 3GPP, but each presented technical challenges.<sup>24</sup> After ongoing analysis and discussions with vendors, it was determined that it did not make sense to select a suboptimal band plan option for the H Block.

Now, however, the H Block uplink is a good option for DISH's network. As we explained in March 2017,<sup>25</sup> DISH's network will incorporate our AWS-4 and 700 MHz E Block licenses, all of which offer only downlink capacity. Given that DISH elected to convert the lower AWS-4 frequencies (2000-2020 MHz) to downlink use in June 2016,<sup>26</sup> we needed to identify suitable uplink spectrum to support our network in the near and long term. For the NB-IoT phase of our buildout, DISH will provide uplink capacity through the H Block uplink.

Since March 2017, DISH has also been evaluating whether its 700 MHz E Block licenses could be leveraged for innovative video services. Given the propagation characteristics and technical rules for our 700 MHz E Block licenses, DISH has been exploring whether Phase 1 of

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<sup>23</sup> See Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands, *Report and Order and Order of Proposed Modification*, WT Docket Nos. 12-70, 04-356; ET Docket No. 10-142, 27 FCC Rcd. 16102, 16135-46 ¶¶ 79-97 (2012) (“AWS-4 Order”).

<sup>24</sup> For example, we analyzed creating a new band that extended the existing PCS band (Band 25) to include the H Block and the lower AWS-4 spectrum, but feedback from device and filter component suppliers confirmed that building duplexers supporting the new band configuration would be challenging due to a very wide downlink passband (90 MHz) and a small gap (10 MHz) between the uplink and downlink bands.

<sup>25</sup> See March 2017 Report at 1, 4-7.

<sup>26</sup> See Section IV.B., *infra*.

the network might incorporate services based on the next-generation digital TV standard, ATSC 3.0. While NB-IoT is DISH's primary focus in its initial network rollout, we also see potential in ATSC 3.0's innovations in delivering video, including improved over-the-air reception, immersive audio, mobile reception, targeted programming/advertising, automotive services and advanced emergency alerting. Chairman Pai has hailed the benefits of ATSC 3.0, noting that it "has the potential to bring a wide range of benefits to American consumers"<sup>27</sup> including TV on smartphones, enhanced accessibility features for Americans with hearing or visual impairments, and improved public safety capabilities. In April 2018, DISH, as part of a consortium of companies, announced the launch of an ATSC 3.0 market trial in Dallas, Texas. This trial will help DISH "not only pursue opportunities with 'Next Gen' TV technology, but also identify synergies with our IoT and future 5G plans, for example broadcasting data to connected cars."<sup>28</sup> DISH's 700 MHz E Block licenses can provide coverage to 95 percent of the license areas in the United States using ATSC 3.0, while the uplink spectrum assets (including, potentially, the H Block licenses) can be used to provide a unique reverse link channel for broadcast data applications.

### **III. DISH HAS MADE SUBSTANTIAL PROGRESS IN 2017 AND 2018 IN VENDOR CONTRACTS, DEPLOYMENT, STANDARDS EFFORTS, AND PRODUCT DEVELOPMENT**

#### **A. Vendor Contracts and Deployment Progress**

Since filing the March 2017 Report, DISH has entered into contracts with dozens of vendors for base stations, chipsets, devices, towers, core network, and other key inputs, and DISH's engineering and deployment teams have been working with vendors on technical and operational milestones. DISH has also continued with standards work to ensure that its spectrum assets, including the H Block, will be used efficiently in the larger wireless ecosystem. DISH has been an active participant in the global standards process since 2012, helping drive the

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<sup>27</sup> Authorizing Permissive Use of the "Next Generation" Broadcast Television Standard, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 17-158, GN Docket No. 16-142, Statement of Chairman Ajit Pai (Nov. 2017), available at [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-17-158A2.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-158A2.pdf).

<sup>28</sup> "DISH Successfully Trials 'Next Gen' Broadcast Standard in Spectrum Co.'s Dallas SFN Project," PR Newswire (Apr. 8, 2018), available at <http://www.prnewswire.com/news-releases/dish-successfully-trials-next-gen-broadcast-standard-in-spectrum-cos-dallas-sfn-project-300625739.html>.



standardization of several bands and being involved in other related activities. The March 2017 Report detailed DISH's years of efforts to incorporate the AWS-4 and H Block frequencies into 3GPP Bands 66 and 70.<sup>29</sup> Band 70 includes, among other things, the H Block downlink frequencies at 1995-2000 MHz.

With standards work sufficiently progressed for a portion of DISH's key spectrum assets and with the buildout deadline for AWS-4 and 700 MHz E Block less than two years away, DISH has entered into a variety of contracts to realize its near term and long term network buildout objectives, and has many other contracts in negotiation. Since filing the March 2017 Report, DISH has completed the following:

- DISH entered into radio development deals with several technology vendors for equipment to be deployed in DISH's NB-IoT network.
- DISH entered into a contract under which a vendor will provide DISH with the core network for our NB-IoT deployment.
- DISH entered into a development agreement with a company specializing in IoT technologies. Under this agreement, the vendor will develop and supply chipsets and modules for DISH's network.
- DISH hired an RF planning and design firm to ensure coverage in each license area.
- In 1Q 2018, DISH entered into Master Lease Agreements ("MLAs") with more than a dozen tower companies, both national and regional.
- Currently, as a follow-on to the above-described development agreements, DISH has been negotiating definitive master supply agreements for, among other things, radios and chipsets, which will cover equipment purchasing, installation and deployment support, and ongoing customer care.
- Throughout 2018, DISH has also been in the process of signing agreements with regional and nationwide vendors to perform site acquisition, installation, and other construction services.

Our deployment of Phase 1 of the network is expected to be conducted in stages, with the first deployments starting by the end of this year. Among other things, we expect the core network will be commissioned and installed this summer. Based on what our vendors have indicated, we expect to take delivery of radios for the network in the fall of this year, and we are

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<sup>29</sup> See March 2017 Report at 11-19.

in the process of identifying and acquiring tower sites. We plan to install radios on towers in an initial wave of markets by the end of this year. Deployment will continue throughout 2019. Standalone 5G standardization work will continue in parallel and, as a result, following the completion of Phase 1, we plan to upgrade and expand the network to full 5G.

## **B. Standards Efforts**

As 5G is increasingly the focus of the wireless industry, DISH continues to identify options to leverage 5G technologies for our deployment, and we continue to be active in the 5G standardization process while also working to achieve Phase 1. Among other things, we have continued our efforts to ensure that 5G specifications include an option for a new wireless entrant to deploy a standalone 5G network without needing a 4G network as its anchor.

The company has already taken significant steps at 3GPP in furtherance of its deployment. With the standardization of Band 66 in December 2015 and Band 70 in June 2016, we turned to the industry effort of implementing the two main requirements for 5G wireless networks: ultra high-speed data (tens of gigabits per second), and massive connectivity (up to a million devices per square kilometer). Based on our contributions and those of many other stakeholders, 3GPP has aligned its standardization plan to support these requirements with Release 15 and beyond.

In September 2015, 3GPP held its first RAN 5G workshop inviting companies to present their view on 5G and its requirements. At this workshop, DISH presented its perspective on 5G that included requirements to “offer flexibility to deploy a completely new network” and “allow new types of partnerships and sharing arrangements” in addition to traditional network and spectrum sharing methods.<sup>30</sup> In the past year, DISH has remained heavily engaged with driving timelines and requirements for standalone 5G specifications at 3GPP. Unlike the 700 MHz context, for example, DISH has had to lead alone on AWS-4 and H Block because it is the only company that holds licenses for that spectrum. We have pushed to ensure that these specifications include DISH’s licensed spectrum, including AWS-4, H Block, and 600 MHz. Our efforts helped to secure the minimum system bandwidth in 5G to be 5 MHz which, among other things, will increase our ability to deploy our various spectrum licenses for 5G operations.

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<sup>30</sup> “DISH’s Perspective on 5G,” 3GPP RAN Workshop on 5G, RWS-150015, 3GPP (Sept. 2015), available at [ftp://ftp.3gpp.org/workshop/2015-09-17\\_18\\_RAN\\_5G/Docs/RWS-150015.zip](ftp://ftp.3gpp.org/workshop/2015-09-17_18_RAN_5G/Docs/RWS-150015.zip).

DISH's team also led the charge to support asymmetric pairing of uplink and downlink channel bandwidths in 5G. Finally, we have maintained our efforts to support the development of 5G technologies over satellites and other non-terrestrial network architectures.

### **C. Product Development**

With work progressing steadily on the core, chipset, RF design, and radios for DISH's network, we are also working in parallel to identify product and service use cases. We are focused on bringing to market multiple products that leverage the unique advantages of NB-IoT technology – low cost, extended coverage, and long battery life.

For example, DISH recently acquired a Denver-based IoT company named ParkiFi. ParkiFi's technology includes hardware and software to find empty parking spots, and uses weatherproof Internet-connected sensors. By investing in an innovative IoT technology, DISH is exploring "other applications and verticals that [the] internet of things can address," and ParkiFi's "expertise from design, development and IP development can influence or extend into those other (areas)."<sup>31</sup> DISH is in discussions with various vertical industries for other products and services, and expects that the offered products and services for its network will appeal to consumers and businesses as well as state and local governments.

## **IV. DISH'S INVESTMENT IN NB-IoT AND 5G IS INFORMED BY THE FCC'S FLEXIBLE USE POLICIES**

As we said in our March 2017 Report, it would be a wasteful exercise to build out a large scale 4G/LTE network now that would duplicate networks already offered by the wireless incumbents, and subsequently require an almost immediate upgrade in order to be competitive. Indeed, the FCC's flexible use policies permit DISH and other entrants to have the flexibility to build out networks using the technologies of their choice, develop their business plans without the heavy hand of government intervention, and ultimately offer the products and services they believe can best meet market demand.

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<sup>31</sup> Tamara Chuang, "Dish Network Races into Internet of Things World by Buying Denver Parking Startup ParkiFi," Denver Business Journal (Feb. 1, 2018), *available at* <https://www.denverpost.com/2018/02/01/dish-network-denver-parking-startup-parkifi/>.

**A. The Commission’s Flexible Use Policies Help Licensees Tailor Investments to Technological Change and Evolving Customer Needs**

In setting performance requirements for various spectrum bands – including AWS-4 and the H Block – the Commission has recognized the need to provide licensees with flexibility to deploy services that suit their business plans. For example, the 2012 *AWS-4 Order* acknowledged that a range of services can be deployed “to make this spectrum available efficiently and quickly for flexible, terrestrial use[.]”<sup>32</sup> The license construction requirements for both AWS-4 and the H Block have benchmarks for providing signal coverage and service without pre-defining the kind of technology to be used by the licensee or the type of service offering.<sup>33</sup> And, in setting service rules for these bands, the Commission explained it was “providing licensees with the flexibility needed to deploy services according to their business plans.”<sup>34</sup>

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<sup>32</sup> *AWS-4 Order*, 27 FCC Rcd. at 16104 ¶ 2.

<sup>33</sup> See 47 CFR § 27.14(q):

“(q) The following provisions apply to any licensee holding an AWS authorization in the 2000–2020 MHz and 2180–2200 MHz bands (an “AWS–4 licensee”):

(1) An AWS–4 licensee shall provide terrestrial signal coverage and offer terrestrial service within four (4) years from the date of the license to at least forty (40) percent of the total population in the aggregate service areas that it has licensed in the 2000–2020 MHz and 2180–2200 MHz bands (“AWS–4 Interim Buildout Requirement”). For purposes of this subpart, a licensee’s total population shall be calculated by summing the population of each license area that a licensee holds in the 2000–2020 MHz and 2180–2200 MHz bands; and

(2) An AWS–4 licensee shall provide terrestrial signal coverage and offer terrestrial service within seven (7) years from the date of the license to at least seventy (70) percent of the population in each of its license areas in the 2000–2020 MHz and 2180–2200 MHz bands (“AWS–4 Final Buildout Requirement”).”

See also 47 CFR § 27.14(r):

“(r) The following provisions apply to any licensee holding an AWS authorization in the 1915–1920 MHz and 1995–2000 MHz bands:

(1) A licensee shall provide signal coverage and offer service within four (4) years from the date of the initial license to at least forty (40) percent of the population in each of its licensed areas (“Interim Buildout Requirement”).

(2) A licensee shall provide signal coverage and offer service within ten (10) years from the date of the initial license to at least seventy-five (75) percent of the population in each of its licensed areas (“Final Buildout Requirement”).”

<sup>34</sup> *AWS-4 Order*, 27 FCC Rcd. at 16174 ¶ 187; *H Block Report and Order*, 28 FCC Rcd. at 9558 ¶ 195 (“We therefore adopt performance requirements that will ensure the rapid deployment of wireless service

The Commission further acknowledged that applying a “flexible regulatory approach” will “provide flexibility to the marketplace, thus encouraging licensees to develop new and innovative services.”<sup>35</sup> The license rules for AWS-4 and H Block are consistent with the Commission’s policies, which have “embraced a flexible use policy for wireless spectrum[,]” have avoided “mandating that a specific type of wireless technology be used in a particular spectrum band,” and “left that choice to the private sector, which is better able to calibrate use to meet consumer demand.”<sup>36</sup> Among other things, Chairman Pai has recognized that “[w]e basically make spectrum available and then do our best to stay out of the way of technological development and the details of implementation.”<sup>37</sup>

Other Commissioners have echoed the importance of the Commission’s flexible regulatory approach in spurring the deployment of innovative new services. Commissioner O’Rielly has explained that “[t]he Commission implements flexible use policies, meaning a winner at auction can deploy whatever service or innovation they choose. The Commission does not and should not make any decisions regarding what can or cannot be deployed in a band, beyond setting technical rules to prevent harmful interference to incumbents and adjacent users.”<sup>38</sup> And, Commissioner Carr recently noted that “our greatest advancements have developed free from the heavy-hand of government intervention,” adding that “[w]e see this perhaps most prominently in the wireless sector. The Commission has adopted flexible use licenses ... and steered clear of mandating the use of specific technologies. This approach has

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in the H Block, while giving licensees sufficient flexibility to deploy services according to their business plans.”).

<sup>35</sup> *H Block Report and Order*, 28 FCC Rcd. at 9552 ¶ 176. *See also AWS-4 Order*, 27 FCC Rcd. at 16189 ¶ 229 (“Similarly, the Consumer Electronics Association (“CEA”) states that this Part 27 flexibility will allow market forces to determine what services are offered in the AWS-4 band. We agree. This flexibility should allow licensees to design their systems to respond readily to consumer demand, thus allowing the marketplace to dictate the best uses of the licensed spectrum.”) (internal citations omitted).

<sup>36</sup> Remarks of Chairman Ajit Pai at the Mobile World Congress, at 2-3 (Feb. 28, 2017), *available at* [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-343646A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-343646A1.pdf).

<sup>37</sup> Remarks of FCC Chairman Ajit Pai at “Broadband for All” Seminar, at 4 (Jun. 26, 2017), *available at* [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-345512A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-345512A1.pdf).

<sup>38</sup> Promoting Investment in the 3550-3700 MHz Band, *Notice of Proposed Rulemaking and Order Terminating Petitions*, FCC 17-134, GN Docket No. 17-258, Statement of Commissioner Michael O’Rielly (Oct. 24, 2017), *available at* [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-347378A4.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-347378A4.pdf).

proven to be a tremendous success for American consumers by allowing providers the flexibility to deploy the latest wireless technologies.”<sup>39</sup>

DISH’s next-generation network is the innovative type of service that the Commission encouraged when it set these flexible use service rules. DISH’s terrestrial deployment will enable the company to immediately help meet the needs of consumers using NB-IoT, while paving the way for a 5G network. It will also allow us to explore non-traditional business models, including potentially serving as a highly secure open source, neutral host, or other shared 5G architecture.

### **B. DISH’s 5G/IoT Plans Evolved, in Part, Because of Technical Rule Choices Made by the FCC**

DISH was forced to adapt its early plans for the H Block and AWS-4 due to how the FCC implemented technical rules governing the two bands. Although the issues ultimately were resolved in a manner that allows for deployment, the technical rules imposed initially delayed the company’s progress and forced a modification of our plans. DISH raised serious concerns with the OOB and power limits for the AWS-4 uplink band,<sup>40</sup> noting the anticipated negative impact that the proposed technical requirements would have on our ability to deploy service in the band.<sup>41</sup> The Commission nonetheless ultimately imposed technical requirements that impaired

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<sup>39</sup> Authorizing Permissive Use of the “Next Generation” Broadcast Television Standard, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 17-158, GN Docket No. 16-142, Statement of Commissioner Brendan Carr (Nov. 20, 2017), available at [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-17-158A5.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-158A5.pdf).

<sup>40</sup> See DISH Network Corporation Petition for Waiver of Sections 27.5(j) and 27.53(h)(2)(ii) and Request for Extension of Time, WT Docket No. 13-225, at 9 (Sept. 9, 2013). See also DISH Network Corporation Comments, WT Docket No. 12-357, at 1-12 (Feb. 6, 2013); DISH Network Corporation Reply Comments, WT Docket No. 12-357, at 6-13 (Mar. 7, 2013); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 12-268 and 13-185; WT Docket No. 12-357 (Aug. 6, 2013); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 12-268 and 13-185; WT Docket Nos. 12-357 and 12-69 (Aug. 2, 2013).

<sup>41</sup> See e.g. Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-70 (Oct. 11, 2012) (“DISH October 11, 2012 Ex Parte”); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-70 (Oct. 17, 2012); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-70 (Nov. 8, 2012); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-70 (Dec. 3, 2012); Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-70 (Dec.

the usability of the AWS-4 uplink band,<sup>42</sup> even while acknowledging that imposition of the limit of  $70 + 10 \log_{10}(P)$  dB may have a “negative impact on the usability of a portion of the AWS-4 uplink band[.]”<sup>43</sup>

DISH also raised concerns about the OOB limit imposed on H Block licensees in the 2013 proceeding setting service rules for that band.<sup>44</sup> The FCC rejected DISH’s concerns, reiterating that it had previously “concluded that 2 GHz MSS operators and AWS-4 licensees must accept harmful interference from future, lawful operations in the Upper H Block due to either Upper H Block OOBs into the 2000-2005 MHz portion of the AWS-4 uplink band or to Upper H Block in-band power (receiver overload) into the AWS-4 uplink band”<sup>45</sup> and that the *H Block Report and Order* was not intended “to revisit these determinations.”<sup>46</sup>

As DISH anticipated, the Commission’s decision did cause delays and changes to DISH’s ability to deploy its spectrum. Among other things, the technical requirements impacted the standardization process for AWS-4. While the AWS-4 licenses were issued in 2012, the process of standardizing the AWS-4 frequencies<sup>47</sup> at 3GPP (designated as Band 23) began in 2010. The two-year process of standardizing Band 23 proved complex because of co-existence problems stemming from the adjacency of the AWS-4 uplink blocks (2000-2020 MHz) to the PCS G & H downlink blocks.

Following the standardization of Band 23, DISH moved forward with efforts to commercialize the AWS-4 band, and in early 2013, issued a network RFI soliciting vendor input on Band 23 infrastructure and network build costs. These discussions with vendors, however, confirmed the uplink impairments associated with the Band 23 arrangement. As a result, DISH

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7, 2012); Letter from Jeffery H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-70, at 2 (Oct. 22, 2012).

<sup>42</sup> *AWS-4 Order*, FCC Rcd. at 16135-16145 ¶¶ 79-97.

<sup>43</sup> *Id.* at 16145 ¶ 97.

<sup>44</sup> Comments of DISH Network Corporation, WT Docket No. 12-357, at 5 (Feb. 6, 2013).

<sup>45</sup> *H Block Report and Order*, 28 FCC Rcd. 9504 ¶ 50.

<sup>46</sup> *Id.*

<sup>47</sup> See Active Work Programme, 3GPP, UID 470009, available at <http://www.3gpp.org/DynaReport/FeatureOrStudyItemFile-470009.htm>.

initiated and completed Band 23 intra-band carrier aggregation work items<sup>48</sup> at 3GPP in late 2013 so that the AWS-4 downlink (2180-2200 MHz) could be utilized, even with the limited AWS-4 uplink allocations.

In September 2013, in the hope of increasing the utility of the band, DISH petitioned the Commission for a waiver of certain AWS-4 technical rules to provide greater flexibility in the use and deployment of the AWS-4 band, including the ability to elect to use all 40 MHz of AWS-4 as downlink spectrum and additional time to meet the final milestone.<sup>49</sup> The Commission granted the request in December 2013, but required that DISH elect to designate the entire AWS-4 uplink band (2000-2020 MHz) either for downlink or uplink operations within 30 months, and that DISH bid the reserve price set for the H Block auction of \$1.56 billion.<sup>50</sup> DISH acquired the H Block licenses at auction in 2014 and made the determination in June 2016 to elect to use the AWS-4 uplink spectrum for downlink.<sup>51</sup> Ultimately, with DISH as the single owner of both the H Block licenses and the AWS-4 licenses, and given DISH's decision to elect all-downlink usage for AWS-4, that spectrum can now be used for DISH's planned NB-IoT and 5G deployments.

## V. CONCLUSION

The wireless industry is in the midst of a technological paradigm shift from legacy technology to a connected world, driven by 5G and IoT. DISH plans to meet the Accelerated H Block Final Milestone by incorporating that spectrum with other DISH licenses to operate an innovative network focused on these new technologies.

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<sup>48</sup> See Evolved Universal Terrestrial Radio Access (E-UTRA); LTE-Advanced Intra-Band Non-Contiguous Carrier Aggregation (CA) in Band 23, Release 12, Spec # 36.833-2-23, 3GPP (Jan. 22, 2015), available at <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=2525>, Evolved Universal Terrestrial Radio Access (E-UTRA); LTE-Advanced Intra-Band Contiguous Carrier Aggregation (CA) in Band 23, Release 12, Specification # 36.833-1-23, 3GPP (Jan. 22, 2015), available at <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=2515>.

<sup>49</sup> See DISH Network Corporation Petition for Waiver of Sections 27.5(j) and 27.53(h)(2)(ii) and Request for Extension of Time, WT Docket No. 13-225 (Sept. 9, 2013).

<sup>50</sup> See DISH Network Corporation, Petition for Waiver of Sections 27.5(j) and 27.53(h)(2)(ii) of the Commission's Rules and Request for Extension of Time, *Memorandum Opinion and Order*, 28 FCC Rcd. 16787, 16787-88 ¶¶ 1-2 (2013).

<sup>51</sup> See Letter from Jeffrey H. Blum, DISH, to Marlene H. Dortch, WT Docket No. 13-225 (Jun. 1, 2016).