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Prepared for the Department of Business, Economic Development and Tourism
State of Hawai`i

Development options for a Hawai`i cable landing station

Contents

A landing station is critical infrastructure for submarine cable systems that provide broadband throughout Hawai`i.

Executive summary

For over a decade, public officials in Hawai'i have been making coordinated efforts to fund infrastructure projects in recognition of what lawmakers, industry leaders, and consumers across the globe know to be true – that access to broadband connectivity is critical to the economic, social, and civil institutions that power communities and nations.

In recognition of this reality, the Hawai'i State Legislature embarked on an agenda to secure a connected future for the people of Hawai'i in 2007 with the formation of the Hawai'i Broadband Task Force, whose mission was "to remove barriers to broadband access, identify opportunities for increased broadband development and adoption, and enable the creation and deployment of new advanced communications technologies in Hawai'i."[1] The Task Force outlined four recommendations to achieve these ends in a report to the Governor and to the Legislature. One such recommendation was to attract trans-pacific submarine fiber to Hawai'i by constructing a carrier-neutral cable landing station on one of the state's major islands.[2] A landing station is critical infrastructure for submarine cable systems that provide broadband throughout Hawai`i. Specifically, it is a structure at which submarine cables makes landfall. The station provides power to the cables, houses terminating equipment, and serves as a location for interconnection with other network elements. A carrier-neutral cable landing station is open to all projects or providers on a fair and equal basis.

The purpose of this white paper is to identify, evaluate and recommend development options to build a cable landing station in Hawai'i. We will evaluate three options to develop the cable landing station:

A. Privately Owned and Operated infrastructure;

B. Government Owned & Operated infrastructure; and

C. Public-Private Partnerships.

The paper includes key and specific factors related to Hawai'i's geographic location, existing infrastructure, potential for financing, availability of government funds, global telecommunication patterns, and other considerations.

1 The Auditor State of Hawai'i and RHD Consulting, LLC, Hawai'i Broadband Task Force Final Report at Foreward (2007), http://files.hawaii.gov/dcca/broadband/reference/Hawaii_Broadband_TaskForce_Final_Report.pdf (2007 Broadband Task Force Final Report).

2 2007 Broadband Task Force Final Report at 9.

I. Overall goals

High-speed, reliable broadband has become indispensable to modern life. Internet connectivity has transformed how Americans engage in civil discourse, conduct business, and connect with the rest of the world. Although Hawai'i's unique geography makes it particularly challenging to deploy broadband throughout the state, Hawai'i's residents are not exempt from the reality that broadband is critical to their meaningful inclusion in the future of the national and global economies.

Hawai'i's location poses unique challenges to broadband deployment. The primary challenge stems from the expense required to construct and maintain remote facilities on and throughout suboptimal terrain. For this reason, and thanks to technological advances over the past 20 years that allow for signals to travel across extended fiber hauls without the need to be regenerated, telecommunications providers have bypassed Hawai'i when deploying a key component of the state's broadband infrastructure—submarine cable landing stations.[3]

This white paper evaluates how private and public stakeholders can collaborate to develop policy, legal, and financing frameworks to resituate Hawai'i as a global hub for broadband connectivity. The state's location in the Pacific Ocean, between innovation centers in the western United States, Asia, and Australia make it ripe for landing cable owned and/or utilized by carriers and data-centric businesses. Beyond Hawai'i's strategic location, the increased bandwidth needs of its residents, the opportunity to drive business to the state, and advanced capabilities to design secure and resilient facilities provide a renewed business case for landing cable within the state.[4] Therefore, this paper evaluates one method to attract new cable systems: lowering the barrier to entry for broadband and edge providers by constructing a carrier-neutral cable landing station within the state.

II. A matter of global survival

The public policy case for broadband has been well documented. Connectivity contributes to improved outcomes for health, public safety, and civic participation. With respect to the economy, affordable broadband is critical to the growth of technological innovation, jobs, and productivity. The pursuit of these objectives has undergirded the past two decades of broadband policymaking across the globe and in Hawai'i.[5] However, the benefits that flow from broadband connectivity are no longer merely laudable goals. They are a matter of global survival.

In the same year that the Hawai`i Department of Commerce and Consumer Affairs (DCCA) published the Hawai'i Broadband Strategic Plan, the International Telecommunications Union (ITU) published one of the first comprehensive studies to document broadband's positive impact on global economies.[6] One of the caveats of the ITU's findings was that broadband has a greater economic impact when it is promoted alongside innovative businesses that rely on advanced applications.[7] Indeed, a carrier-neutral cable landing station encompasses this dual-pronged approach to economic development. Not only will a cable landing station enable greater high-speed access to broadband connectivity, it can support the growth of advanced applications that are critical to Hawai'i's ability to compete – and thrive – in the global economy.

While Hawai'i boasts higher than average broadband penetration rates, additional indicators of a robust broadband ecosystem show that there is much room for improvement. The latest data from the Federal Communications Commission (FCC) indicates that 96.1% of the state's population has access to fixed terrestrial broadband speeds of 25 Mbps (download) / 3 Mbps (upload) and 99.9% of the population has access to mobile LTE speeds of 10 Mbps (download) /

3 Johns Hopkins University Applied Physics Laboratory, Transpacific Systems Concept Document: Revision 1.0 at 1 (2013), http://www.bidnet.com/bneattachments?/427727682.pdf (Johns Hopkins Concept Document).

4 Johns Hopkins Concept Document at ES-5.

5 See generally Federal Communications Commission, National Broadband Plan (2010), https://www.fcc.gov/general/national-broadband-plan; Department of Commerce and Consumer Affairs, State of Hawai`i, Hawai`i Broadband Strategic Plan (2012), https://cca.hawaii.gov/broadband/files/2015/01/Hawaii_Broadband_Strategic_Plan_Dec_2012.pdf.

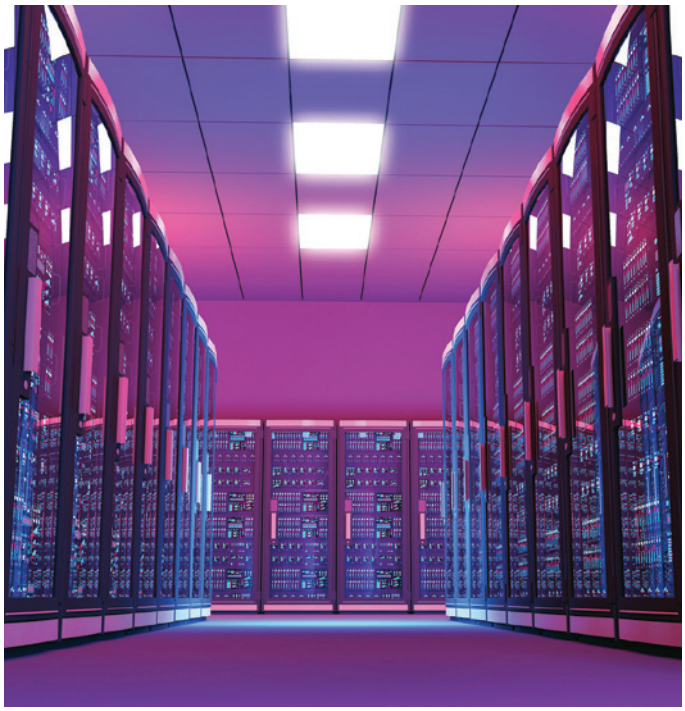
6 See generally International Telecommunications Union, Impact of Broadband on the Economy (2012), https://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf.

7 Id. at 8.

3 Mbps (upload).[8] These figures break down to 71.5% of the population in rural areas, and 98.6% of the population in urban areas for fixed broadband, and 99.2% of the population in rural areas, and 100% of the population in urban areas for mobile broadband.[9] Obviously, more needs to be done to encourage rural deployment. Moreover, broadband penetration rates do not provide insight into whether the network can support the speeds required for advanced applications that power connected communities.

It is critical that Hawai'i be equipped to power digital infrastructure. Hawai'i's population is expected to reach nearly 1.7 million people by 2045.[10] The state's de facto population, which accounts for visitors who remain on the islands and residents who are mostly away from their homes, is expected to reach nearly 1.9 million by 2045.[11] Meanwhile, Hawai'i's GDP is not expected to grow at the same pace as the population. Factors that contribute to projections of only gradual GDP growth are an increase in the elderly population, and decreases in investment and tourism.[12] An increase in population without a comparable boost to the economy means that Hawai'i must look for ways to accommodate more people while creating costs savings and encouraging investment. This is the opportunity that connectivity provides.

Specifically, a carrier-neutral cable landing station can attract the infrastructure needed to support advanced cloud computing, autonomous vehicle technology, "smart" cities, and the development of a leading electronic gaming industry in Hawai'i. Leading cloud providers such as Amazon, Microsoft, and Google have been driving recent undersea cable projects due to their extreme bandwidth needs.[13] Making it attractive forthese and other edge providers to land in Hawai'i would be a boon for the state's cloud computing capabilities and the small businesses—which comprise around 99% of Hawai'i's businesses and half of its workforce[14]—that may rely on such services. Cloud services enable small businesses to scale affordably and increase productivity by using automated accounting and customer service platforms.[15] Delivery of software as a service (SaaS) is expected to drive the cloud industry by 2021.[16] With access to cloud infrastructure, and the bandwidth to power SaaS applications, small businesses in Hawai'i may unlock big data, artificial intelligence, and machine learnable technologies that otherwise may have been out of reach to improve their businesses.



8 Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, GN Docket No. 18-238, 2019 Broadband Deployment Report, FCC 19-44, Appendix 1 (2019). We do note that according to multiple report, and the FCC's own admission, it's data is not consistently reliable. Letter from Ajit Pai, Chairman, Federal Communications Commission, to Hon. Brian Schatz, U.S. Senator (Aug. 1, 2019); Jon Brodkin, The FCC has no idea how many people don't have broadband access, ARS TECHNICA (Aug. 22, 2019), https://arstechnica.com/tech-policy/2019/08/the-fcc-has-no-idea-how-many-people-dont-have-broadband-access/.

9 Id.

10 Research and Economic Analysis Division Department of Business, Economic Development and Tourism State of Hawai`i, Population and Economic Projections for the State of Hawai`i to 2045 at 1 (2018), https://files.hawaii.gov/dbedt/economic/data_reports/2045-long-range-forecast/2045-long-range-forecast.pdf.

11 Id. at 3

12 Id. at 7.

13 Thomas Seal, The Undersea Cable Market Is Booming Again, This Time Funded by Big Tech, BLOOMBERG (Mar. 14, 2019), https://www.bloomberg.com/news/articles/2019-03-14/undersea-cables-are-no-longer-underwater-as-fiber-booms-again.

14 United States Small Business Administration Office of Advocacy, 2018 Small Business Profile: Hawaii, https://www.sba.gov/sites/default/files/advocacy/2018-Small-Business-Profiles-HI.pdf.

15 Makada Henry-Nickie, Kwadwo Frimpong, and Hao Sun, Brookings, Trends in the Information Technology sector (Mar. 29, 2019), https://www.brookings.edu/research/trends-in-the-information-technology-sector/#footnote-26.

16 Cisco, Global Cloud Index: Forecast and Methodology, 2016-2021 (2018), https://www.cisco.com/c/en/us/solutions/collateral/service-provider/global-cloud-index-gci/white-paper-c11-738085.html.

E-sports can provide another boost to the local economy, bringing tourists, younger residents, and a growing industry to the islands.[17] However, attracting the e-sports industry requires immense broadband capacity. Today's games require bandwidth to support high-definition images and the ability to respond immediately to in-game actions – i.e. low latency.[18] A player's ability to respond quickly to other players is affected by the distance between his gaming system and the game server. Because of Hawai'i's location, local players are typically further away from game servers and their opponents – putting them at a disadvantage when playing against those outside of the state and making it difficult for Hawai'i to compete in the e-sports industry, which is expected to generate $1.5 billion by 2023.[19] For Hawaiian players to be competitive, and for the state to attract big-ticket competitions, will require servers and other network elements to be located within the state.

Increased capacity for broadband-intensive applications can also power Hawaiian smart cities that better manage natural resource consumption and provide public services more efficiently.[20] For example, energy consumption, traffic congestion, and wastewater management are all problems that cities across the country are tackling through Internet-enabled technologies and comprehensive data about how individuals use public, shared resources.[21] In Hawai'i, Verizon partnered with Hawaiian Electric Company (HECO) to install sensors on solar-powered rooftops to collect data on the utility's energy grid levels and help customers understand their consumption habits. This project was only possible because partnering with Verizon allowed HECO to leverage the carrier's existing network instead of building its own. Given the fixed amount of network infrastructure available in the state, Hawai'i will exhaust the potential for similar projects. If Hawai'i expects to make further advances in the smart cities space, it must be willing to invest in the broadband

17 Casey Harlow, What Will It Take To Make Hawai'i A Player In eSports?, HAWAII PUBLIC RADIO (Jul. 1, 2019), https://www.hawaiipublicradio.org/post/what-will-it-take-make-hawai-i-player-esports#stream/0.

18 Pete Mastin, How latency is killing online gaming, VENTURE BEAT (Apr. 17, 2016). https://venturebeat.com/2016/04/17/how-latency-is-killing-online-gaming/ (noting that gamers are twice as likely to quit a game when they experience a network delay of .05 seconds).

19 Mariel Soto Reyes, The ESports Ecosystem: The key players and trends driving the red-hot, fast-growing esports space that's on track to surpass $1.5 billion by 2023, CNBC (Nov. 14, 2019), https://www.businessinsider.com/the-esports-ecosystem-2019-11.

20 See Alexandre Gonfalonieri, Big Data & Smart Cities: How can we prepare for them?, MEDIUM: DATA SERIES, (Dec. 18, 2018), https://medium.com/dataseries/big-data-and-smart-cities-why-we-need-them-now-a194b2498fb1, Sue Wilkinson, Microsoft Industry Blogs, How smart cities are putting people first in the urban world (Jul. 23, 2019), https://cloudblogs.microsoft.com/industry-blog/government/2019/07/23/how-smart-cities-are-putting-people-first-in-the-urban-world/.

21 See Jennifer Weingart, These Smart Sewers Are Part Of A Growing Trend Connecting Infrastructure To The Internet, NPR, May 8, 2018, https://www.npr.org/2018/05/08/609493403/these-smart-sewers-are-part-of-a-growing-trend-connecting-infrastructure-to-the-; Steffen Sorrell, Juniper Research, Worldwide Smart Cities: Energy, Transport & Lighting 2016-2021 (2016), https://www.juniperresearch.com/researchstore/key-verticalmarkets/smart-cities/energy-transport-lighting; United States, Department of Energy, Office of Electricity Delivery & Energy Reliability, The American Recovery and Reinvestment Act Smart Grid Highlights (2014), https://energy.gov/sites/prod/files/2014/12/f19/SGIG-SGDP-Highlights-October2014.pdf.

infrastructure that forms the backbone of a connected city.[22] Likewise, investment in broadband infrastructure will better enable the state to meet the needs of a 21st century government. Broadband allows governments to streamline internal operations, to interact with people in local communities more efficiently and at a lower cost by going online, and to collect and manage better data about residents' needs and how the government responds to those needs.

III. Key components of broadband

Transpacific fiber optic cable is the backbone of Hawai'i's broadband network. For decades, Hawai'i was a required stop along routes for copper wire and early fiber that provided connectivity from Asia to the United States. However, advancements in technology have led to longer fiber spans, which means that for nearly 15 years (from 2001 – 2016) new systems have bypassed the state when traversing the Pacific Ocean, along with bypassing the expense of constructing and maintaining a cable landing station.

Since the publication of the 2012 Strategic Plan, two new transpacific fiber optic cables have come to Hawai'i. In 2017, Hawaiian Telecom, along with consortium partners, completed the SEA-US Transpacific Fiber Marine Cable System (the "SEA-US System"), which connects Indonesia, the Philippines, Guam, Hawai'i and California. The SEA-US System offers bandwidth to other service providers and enterprise customers. In 2018, New Zealand's Hawaiki Submarine Cable LP launched the carrier-neutral Hawaiki Cable, which connects Australia, New Zealand, and the United States and includes a carrier-neutral cable landing station in Kapolei.[23]

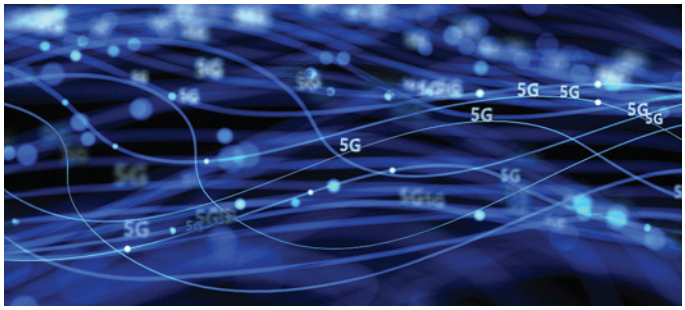
Transpacific undersea cables are only one component of Hawai'i's broadband infrastructure. Other critical elements include: interisland cable systems, or the submarine cables that run between islands; interconnection points where transpacific and interisland cables meet and exchange traffic; submarine backhaul networks that connect a cable landing station to a transpacific/interisland cable interconnection point; user premises including data centers, community anchor institutions, businesses, and residential customers, and intra-island networks that connect these end users to the transpacific/interisland cable interconnection point, inclusive of access aggregation points, and terrestrial backhaul and last mile networks.[24] The last mile is how users connect with a local network provider and is how end users typically view their Internet service — as a wireline (e.g. copper line/DSL, fiber to the home) or wireless (e.g. satellite, cellular, Wi-Fi) connection.

22 See United Stated Department of Commerce, International Trade Administration, Smart Cities, Regions & Communities: Export Opportunities at 177 (2016), https://www.trade.gov/markets/smartcities.pdf (citing broadband deployment as a critical element in the development of smart city technology).

23 Hawaiki Submarine Cable LP, Hawaiki Submarine Cable System Route at 1 (2017), http://honolulu.granicus.com/MetaViewer.php?view_id=3&clip_id=502&meta_id=23363.

24 Johns Hopkins Concept Document at 8-13.

Today, many of the discussions about the last mile taking place among federal and state lawmakers, consumers, and the media are focused on 5G, which is the term for fifth generation wireless standards that include faster speeds and lower latency than existing wireless connections.[25] While 5G is wireless technology that will be deployed using millions of small cells erected on existing structures such as traffic signals, billboards, and roadside units, the new technology (just as existing wireless technology) relies on wired infrastructure. In Hawai'i, this means that successful deployment of 5G will require dense, robust fiber optic terrestrial backhaul, intra-island, interisland, and submarine networks. More specifically, successful deployment of 5G will require sufficient wired broadband capacity, of which there is a finite amount across available cables landed within the state. To secure 5G and whatever technology comes next, Hawai'i must have a reliable, robust strategy to incentivize landing submarine cable within its borders.



IV. Key development options

There is consensus among lawmakers at all levels, across industries, and communities comprised of varying demographics that broadband is critical to realizing economic opportunity. Specifically, stakeholders within Hawai'i have expended great resources to evaluate the state of broadband and strategize how to optimize penetration. However, Hawai'i, like many other states and municipalities, has not reached consensus about how to finance and construct broadband facilities.

Funding and deployment of broadband projects face huge hurdles because of the tradeoffs involved in allocating costs, risks, and benefits between public and private stakeholders. Below we discuss the advantages and disadvantages associated with private, public, and public-private partnership models to build and finance the proposed cable landing station, using existing broadband infrastructure projects as illustrative examples.

A. PRIVATELY OWNED AND OPERATED INFRASTRUCTURE

Historically, broadband infrastructure construction, ownership, and management has been left to the telecommunications industry.[26] From a regulatory perspective, Americans have looked to competition to promote innovative technologies and business models, and there has been success on this front.[27] However, the reality remains that the deployment of physical broadband infrastructure highly depends on the economic feasibility of a project. Beyond the expense associated with deployment in an area with Hawai'i's challenging geography, key factors that influence a return on investment are population density, network effects, and economies of scale. Predictably, this has led to significant gaps in coverage to sparsely populated areas where the costs-per-customer of providing service are extremely high.[28] These factors are important for our analysis because they inform the willingness of the private sector to invest in a cable landing station, or to provide service in Hawai'i using the station.

Population density offers a key insight into the likelihood of the private sector to invest because where people are housed close together, the costs of building and operating a network are lower, while the projected revenue for a given amount of people does not change. This factor weighs in favor of investment in Hawai'i-based infrastructure, as the state ranks 13th on this metric, with 211.8 persons per square mile.[29]

25 Rob Pegoraro, What will 5G mean for you? A reality check on the hype, FAST COMPANY (Oct. 23, 2018).
26 See NCTA: The Internet & Television Association, Delivering Broadband to All Americans at 2 (2017), https://www.ncta.com/sites/default/files/2017-10/NCTA%20Issue%20Brief_%20DELIVERING%20BROADBAND%20TO%20ALL%20AMERICANS%20June%202017(PHOTO).pdf (NCTA Broadband Issue Brief).
27 See Resorting Internet Freedom, Declaratory Ruling, Report and Order, and Order, WC Docket No. 17-108, 33 FCC Rcd 311, 312 para. 20 (2018).
28 NCTA Broadband Issue Brief at 2-3
29 United States Census Bureau, Guide to 2010 State and Local Geography: Hawaii, https://www.census.gov/geographies/reference-files/2010/geo/state-local-geo-guides-2010/hawaii.html (last visited Sep. 2, 2019).

"Network effect" refers to the marginal increase in value of a network as additional users join. This concept applies system-wide.[30] As more members of a population adopt broadband, the population can operate with the assumption that residents use broadband and achieve resulting efficiencies (e.g. applying for social services online). As noted above, Hawai'i has a significant broadband penetration and adoption rates. Therefore, providers can assume that residents will use their services to the extent they are accessible and affordable.

Economies of scale refers to how the costs of providing a network decrease as additional users join. The up-front costs of deploying broadband infrastructure cannot be off-set. However, once a network is up and running, or once a provider has invested in and connected to a cable landing station, the marginal costs of adding new customers (e.g. another landing partner) are relatively low.[31] Furthermore, this indicates that where there are fewer people or businesses to use a network, or the edge services provided over the network, it is more efficient for fewer firms to serve an area.

While Hawai'i does have fewer available users and businesses than other states or regions to achieve economies of scale, the unique character of its networks can still support the entry of more firms. Broadband provisioned over submarine cables eventually exhausts its capacity. Prior to the arrival of the SEA-US and Hawaiki cables, the remaining paths connecting Hawai'i were expected to run out of capacity in 2020.[32] Indeed, the willingness of Hawaiian Telecom and Hawaiki Cable Limited to invest systems that connect to the state demonstrates that a business case for landing on Hawai'i's islands exists. Specifically, the Hawaiki investment demonstrates the business case for an open access cable landing station, of which the Hawaiki station is the first of its kind in Hawai`i.

Putting aside government intervention to incentivize investment in infrastructure, industry players will need to see a demonstrable benefit to constructing and operating a cable landing station in Hawai'i. The natural first place to look for this evidence is the performance of, and return on investment realized by, the Hawaiki station. Therefore, to the extent that a privately-owned solution is desirable, we recommend a comprehensive case study of the Hawaiki project.

Beyond whatever lessons can be gleaned from the Hawaiki project, to encourage private investment in a cable landing project, we recommend promoting new and varied monetization mechanisms. The proposed cable landing station would be unlike other privately-owned carrier-neutral facilities that support broadband throughout the United States (e.g. cellular towers, distributed antenna systems, dark fiber assets) because of Hawai'i's terrain and the risk of natural disasters. Firms are not guaranteed to have the same success that traditional carrier-neutral facilities and open-access network providers. Potential targets for private investment in the cable landing station may be those companies that are able to leverage a cable landing station to offer an integrated suite of services, which may include network security, disaster recovery, and traffic management services. Content providers may also choose to invest in bringing a cable landing station to Hawai'i, as they seek new routes across the Pacific Ocean for their data or to unlock new markets for their services.

When considering a privately-owned cable landing station, it is important to note the potential to duplicate the same failures that have plagued the broadband market generally. That is, the ability to control access to and operation of the station, and to extract high rents, may undermine Hawai'i's goals of promoting universal service and developing the state as a gigabit hub open to innovation. As the private model is the current status quo, and has not resulted in the goals of the state relative to broadband being met, Hawai'i should not expect continuing down this path should to yield any changes or expansion of desired results. To maintain a meaningful say in the outcome of the cable landing station project, Hawai'i should consider a public model or a public-private partnership, as discussed below.

30 See D'Arcy Coolican and Li Jin, The Dynamics of Network Effects, Andressen Horowitz Blog (Dec. 13, 2018), https://a16z.com/2018/12/13/network-effects-dynamics-in-practice/. .

31 Steve G. Parsons and James Stegeman, Rural Broadband Economics: A Review of Rural Subsidies at 10 (2018), https://www.ntca.org/sites/default/files/documents/2018-07/CQA-RuralBroadbandEconomics-AReviewofRuralSubsidies_FinalV07112018.pdf.

32 Johns Hopkins University Applied Physics Laboratory, Transpacific Systems Concept Document: Revision 1.0 at 32 (2013), http://www.bidnet.com/bneattachments?/427727682.pdf (Johns Hopkins Concept Document).

B. GOVERNMENT OWNED AND OPERATED INFRASTRUCTURE

States and localities across the country have developed a wide variety of approaches to the government's involvement in the financing, construction, and provision of broadband networks. About 25 states either prohibit municipally-funded broadband networks or have adopted significant barriers to investment.[33] In other states, governments have collaborated with local community leaders to build and promote networks to serve as an affordable alternative to incumbent providers. Whether and to what extent governments allow or self-provision broadband networks largely depends on their overall goals and the influence of existing ISPs.

1. Government funding

In recognition of the economic case for broadband, in 2009, the federal government set aside billions of dollars to fund the Broadband Technology Opportunities Program (BTOP), which sought to improve broadband access in unserved or underserved areas.[34] Relevant to this discussion are the various middle-mile fiber projects that were carried out under the program. Middle-mile backbone infrastructure brings high-speed fiber closer to cities, and has prompted municipalities to develop new ways to bring last-mile fiber to homes and businesses that the private sector had neglected due to lack of sufficient demand.[35]

One of the most successful examples of government-funded broadband infrastructure is the municipally owned network in Chattanooga, TN—a city of approximately 175,000 people. The fiber network there received $220 million in public financing from EPB, a municipally-owned electric utility that also operates the network. The U.S. Department of Energy also contributed $111.77 million to the project from stimulus funding intended to modernize the country's

33 Kendra Chamberlain, Defining Municipal Broadband Roadblocks, BroadbandNow, https://broadbandnow.com/report/municipal-broadband-roadblocks/ (last visited Nov. 3, 2019).

34 United States Department of Commerce, National Telecommunications and Information Administration, Broadband Technology Opportunities Program, https://www.ntia.doc.gov/category/broadband-technology-opportunities-program (last visited Nov. 6, 2019).

35 Robert LaRose et al., Public Broadband Investment Priorities in the United States: An Analysis of the Broadband Technology Opportunities Program, 31 GOV'T INFO. Q. 53-64 (2014).

energy infrastructure, as the project was tied to the development of a smart grid.[36] EPB's electric division also contributed a $50 million loan to the utility's broadband division for the broadband side of the project.[37] The public sector shouldered the entire risk of these investments. One tradeoff inherent to the project was how to spend public tax dollars to pay down the debt—money allocated to the network could not be allocated to other vital social services. Furthermore, while ultimately the city saw sufficient returns, had the project not succeeded, EPB's electric customers could have seen higher rates. Such is the risk in any publicly-funded project.

Another risk to public projects is corporate pushback. Opposition to the government-run Chattanooga project came from incumbent cable providers who argued that the government should not be able to compete for their customers. Here, in the cable landing station context, such opposition from at least some industry players is less likely to manifest, as service providers are moving away from the model of investing in landing stations. Instead, industry welcomes the elimination of a cable landing station from their capital expenditures and obtaining access to the station's operations straight away.[38] The most likely opposition to a government-backed cable landing station may come from stakeholders that build and operate carrier-neutral facilities themselves.[39] However, in the long run, the state has not expressed the desire or capacity to self-provision the construction and operation of a landing station. Given this fact, and the potential to significantly mitigate risk by working with a cable landing station provider, a partnership model may have the best chance for success in Hawai`i.

2. Regulation and investment

Since BTOP launched, the debate around how federal, state, and local regulations affect investment in broadband infrastructure has intensified. Lawmakers continue to grapple with when and how to set money aside for infrastructure (e.g. the federal Connect America Fund and the Hawai'i Legislature's multiple attempts at appropriating funds for a cable landing station) and how administrative requirements affect timing and willingness to invest (e.g. permitting and surveying rules). A renewed approach to state regulation of submarine cables and landing stations is a primary way in which Hawai'i may maintain a central role in advancing its broadband goals.

In the submarine cable context, a key regulatory factor that may influence the decision to land cable at a given site is the ease and cost of permitting. The Johns Hopkins Concept Document outlines in great detail the permits required for a new cable landing station in Hawai'i.[40] Hawai'i's permitting process involves a patchwork of state and federal agencies, all operating within silos. Oregon, on the other hand, relies on a "networked" permitting system that calls for state, local, and federal agencies to coordinate and ensure that their policies align with those of their counterparts. As a result, Oregon has emerged as a preferred landing choice.[41]

Oregon's approach to permitting can be instructive. To date, Hawai'i has attempted to exempt the proposed state-backed cable landing station project from certain county and state permitting and procurement requirements.[42] Such a proposal to effectively eliminate established oversight of critical infrastructure can be politically fraught and risky.[43] Instead, Hawai'i may consider amendments to relevant regulations that allow agencies to participate in the oversight and approval of

36 Dave Flessner, Chattanooga boosts citywide broadband capacity to 10 gigabits, CHATTANOOGA TIMES FREE PRESS (Oct. 15, 2015), https://www.timesfreepress.com/news/local/story/2015/oct/15/chattanooga-becomes-first-10-gigabit-city-world/330691/.

37 Charles M. Davidson and Michael J. Santorelli, Understanding the Debate Over Government-Owned Broadband Networks: Context, Lessons Learned, and a Way Forward for Policymakers: Chattanooga Case Study (Updated) at 2 (2015), http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Chattanooga-Case-Study-updated-October-2015.pdf

38 Capacity Media, Data at the water's edge: The end of the traditional cable landing station?, (Jan. 4, 2018) https://www.capacitymedia.com/articles/3778685/Data-at-the-waters-edge-The-end-of-the-traditional-cable-landing-station.

39 For example, in testimony relating to proposed legislation to create the state-owned cable landing station, existing carrier-neutral cable landing station owner only pointed out faults with the proposal and advanced its own capability to land Ocean Network's cable, even though Ocean Network prefers a government-backed landing station. Comments of Hawaiki Submarine Cable USA before the Hawai`i House Committees on Economic Development & Business and Intrastate Commerce (Feb. 6, 2019).

40 Johns Hopkins Concept Document at 88.

41 Johns Hopkins Concept Document at 85

42 HB 821, 39th Leg.(Haw. 2019).

43 See Testimony of Sarah Allen, Administrator, State Procurement Office Testimony presented before the Hawai`i Senate Committees on Economic Development & Business and Intrastate Commerce (Feb. 6, 2019).

the cable landing station on a standardized, fast-tracked schedule. This could take the form of a shot clock to review applications (e.g. 60-90 days) and/or request and review additional materials (e.g. 10 days), after which approval would be deemed granted. Additionally, the state might consider: a standardized application form that is used by each agency that is required to issue a permit; a single point of contact that aggregates updates and information needs for all relevant agencies; a single point of contact to facilitate federal permitting and review processes; and a system to automatically correct clerical errors in application materials. These reforms address the fundamental concerns relating to permit application review times and complexity of the application process while preserving the government's ability to identify and address potential harm.

What's more, in order to advance the goal of attracting new cables to the proposed station, Hawai'i should identify and implement streamlined processes, using Oregon as an example, for approving new cables to land, not just the permits for the landing station. The providers that own or use transpacific cables to provision service and carry their data favor certainty with respect to what is required to obtain approvals and predictability with respect to the timeline for such approvals.[44]

Finally, in H.B. 821, the Hawai'i Legislature identified an important potential benefit of a carrier-neutral cable landing station: easy cross connection to other networks. This is not just a benefit, however; it is a critical element of attracting service and content providers. As such, the legislature should study and then propose policies to induce existing networks and data centers to connect to the landing so that cable owners may interconnect freely.

C. PUBLIC PRIVATE PARTNERSHIPS

By embracing a partnership model, Hawai'i may craft an infrastructure solution that suits the state's specific needs and reflects the unique characteristics of the submarine cable industry. Through a public-private partnership, the public may share risk and rewards and reserve sufficient input into the process to ensure that

broader policy objectives of enabling competition and universal service remain at the forefront. Below we discuss three partnership models for consideration: 1) public facilitation of private investment; 2) public funding and private execution; and 3) shared investment and risk.

1. Public facilitation of private investment

Public facilitation of private investment is a model well-suited to leveraging as much economic benefit as possible from a private firm while making it as seamless and low-cost as possible for the firm to deploy infrastructure. With this model, nearly all of the financial risk is assumed by the private sector. In exchange, the government eases regulations and waives fees to allow accelerated deployment. Google Fiber in Kansas City (Missouri and Kansas) is a prime example of this model in the broadband context.

In Kansas City, Google spent an estimated $94 million in up-front costs to build a fiber network.[45] In return for the promise to help bridge the Kansas City digital

44 What's more, in order to advance the goal of attracting new cables to the proposed station, Hawai'i should identify and implement streamlined processes, using Oregon as an example, for approving new cables to land, not just the permits for the landing station. The providers that own or use transpacific cables to provision service and carry their data favor certainty with respect to what is required to obtain approvals and predictability with respect to the timeline for such approvals.

45 Jay Yarrow, It's Surprisingly Inexpensive For Google to Build Its Cable-Destroying Google Fiber Network, BUSINESS INSIDER (Apr. 8, 2013), https://www.businessinsider.com/the-cost-of-building-google-fiber-2013-4.

divide, the local government in both states allowed Google to access public rights-of-way without paying fees, expedited the permitting process, and dedicated staff to help Google navigate the process.[46] To benefit their communities, the mayors of Kansas City on either side of the state line created an innovation team, which still works closely with Google, to develop a playbook to identify and implement ways to leverage the fiber network to achieve their policy goals: closing the digital divide, increasing digital infrastructure, and promoting economic development.

However, seemingly in opposition to their universal service-related goals, the local governments also allowed Google to build the network based on pre-determined demand instead of building the network to serve everyone.[47] In other words, Google was able to get an assurance that it would recoup its investment. At the time, many argued that this assurance came at the cost of achieving the public's primary goal — equitable access to affordable, fast broadband.[48] In response to these criticisms, one community group that was formed as part of the effort highlighted that while Google had not closed the digital divide overnight, it had taken a comprehensive, inclusive approach to solving a problem for which it was not responsible and had seen success.[49]

It has been nearly nine years since Google announced that it would deploy its first gigabit network in Kansas City. Broadband policy experts now characterize the project as a success on some fronts, and a disappointment on others. On one hand, many Kansas City residents that signed up for Google Fiber and were promised service never received it. Moreover, the digital divide in Kansas City remains stark. The Kansas City Coalition for Digital Inclusion reports that 70% of kids in the Kansas City Public School District do not have

46 Holly Trogdon, Lessons from Google Fiber: Why Coordinated Cost Reductions to Infrastructure Access Are Necessary to Achieve Universal Broadband Deployment, 66 FED. COMM. L. J., 103-38 (2013).

47 Id. at 116.

48 See Aaron Deacon, The Truth About Google Fiber and the Digital Divide in Kansas City, KC DIGITAL DRIVE BLOG (Apr. 3, 2015), https://www.kcdigitaldrive.org/article/the-truth-about-google-fiber-and-the-digital-divide-in-kansas-city/ (summarizing and rebutting criticism of the Google Fiber project); Kansas City Star Editorial Board, Google Fiber has changed Kansas City, but hasn't transformed it, KANSAS CITY STAR (Sept. 24, 2017), https://www.kansascity.com/opinion/editorials/article174936081.html.

49 See Aaron Deacon, The Truth About Google Fiber and the Digital Divide in Kansas City, KC DIGITAL DRIVE BLOG (Apr. 3, 2015), https://www.kcdigitaldrive.org/article/the-truth-about-google-fiber-and-the-digital-divide-in-kansas-city/ (summarizing and rebutting criticism of the Google Fiber project); Kansas City Star Editorial Board, Google Fiber has changed Kansas City, but hasn't transformed it, KANSAS CITY STAR (Sept. 24, 2017), https://www.kansascity.com/opinion/editorials/article174936081.html.

home internet access and that 25% of residents overall do not have access.[50] Google's lack of capacity and experience dealing with infrastructure needs has also led to inadequate responses to weather-related outages and an unwillingness to further expand its footprint.[51] As a result, households are abandoning the service and some negative sentiments among the public persist.

Still, Google Fiber did yield positive outcomes at a macro level in Kansas City. Notably, in response to Google entering the market, competitors began offering customers better service and prices. Time Warner Cable tripled the speed of its broadband service, while maintaining its prices. AT&T matched Google Fiber with respect to price and speed.[52] Kansas City also emerged as a tech hub, as Google Fiber included a small business offering that allowed startups and data-heavy businesses to operate more efficiently.[53] In the four years following Google Fiber's introduction, Kanas City first-time employers, including many start-ups, added 84,000 jobs and available investment capital increased 290%.[54] Google Fiber's entrance also changed how investors and municipalities responded to new infrastructure plans. Investors no longer punish firms for taking on bold infrastructure projects as opposed to gradual upgrades as a matter of course. Federal and local regulators now see that they have to streamline local approval processes in order to attract new services, and are making the necessary adjustments.

The Kansas City Google Fiber project provides critical takeaways about the realities of public facilitation of private investment; and how to avoid some of the shortcomings. First, when a private firm assumes the financial risk associated with an infrastructure project, the public's input in the outcome of the project will be severely limited. In the cable landing context, this means that if Hawai'i were to merely relax regulatory requirements in order to attract private investment, the state could not control whether it remained a carrier-neutral facility, and the public would not be entitled to offer input into how the cable landing station operated or whether the cable landing station even remained operational in the case that its financier decided that it was no longer economically feasible. An agreement between a private investor and the state could attempt to address these issues with performance-based language; however, in the face of repeated failures to secure public funding, a private firm may seek to negotiate broad language in this regard. It follows that in considering public facilitation of private investment, Hawai`i should carefully forecast what guarantees it would like to see from a private investor, and map those guarantees to relaxation of a sliding scale of requirements. In other words, a private investor would gain more regulatory assistance depending on its willingness to make guarantees that align with the state's policy objectives.

Second, just as in Kansas City, larger issues exist that inhibit full access to and adoption of fast, reliable broadband. Therefore, lawmakers and investors should resist the temptation to frame a cable landing station as a one-size fits all solution to a complex policy problem. Eliminating regulatory barriers and the costs associated with a cable landing station will go a long way to incentivize construction of the facilities. Still, leaders must simultaneously work to attract undersea cable owners and edge providers to use those facilities in order to have the desired effect on the local economy. This reality should be clearly communicated to the public so that they remain invested in the process and confident in those leading the project.

50 Kansas City Coalition for Digital Inclusion, About the Problem, https://digitalinclusionkc.org/the-problem (last visited Nov. 15, 2019).
51 Kyle Palmer, Kansas City Customers Consider Leaving Google Fiber After Weeks Without Internet, KCUR.ORG (Jan. 27, 2019), https://www.kcur.org/post/kansas-city-customers-consider-leaving-google-fiber-after-weeks-without-internet#stream/0.
52 Bobby Burch, The Google Fiber Effect: Fiber breeds innovation, competition, KANSAS CITY BUSINESS JOURNAL (Dec. 12, 2014), https://www.bizjournals.com/kansascity/print-edition/2014/12/12/the-google-effect-fiber-breeds-innovation.html?page=all; Ben Popper, AT&T announces it will match Google Fiber's price and speed in Kansas City, THE VERGE (Feb. 17, 2015), https://www.theverge.com/2015/2/17/8050935/att-google-fiber-kansas-city-gigapower-internet-price-match.
53 Patrick Sisson, In Kansas City, Google Fiber has mixed results, CURBED (Jan. 17, 2017), https://www.curbed.com/2017/1/17/14298148/kansas-city-google-fiber-tech-hub.
54 KC Source Link, We Create: Making KC America's Most Entrepreneurial City, Year 4, at 1 (2017), https://www.kcsourcelink.com/docs/default-source/default-document-library/kcs_wecreatereport_2017_lr.pdf?sfvrsn=4

2. Public funding - private execution

The most straightforward examples of public-private partnerships involve a local government simply paying a private firm to design and build new infrastructure. These partnerships take the form of design-build-finance (DBF), design-build-finance-maintain (DBFM), and design-build-finance-operate-maintain (DBFOM) arrangements. With all of these models, the government owns the underlying infrastructure — in the Hawai`i case, a cable landing station.

While publicly-funded partnerships to support undersea cable landing projects in the U.S. are unprecedented, the terrestrial fiber market offers several examples of the above models. DBF structures, pursuant to which a local government awards a contract for the design, construction, and full or partial financing of facilities, although increasingly prevalent, are rare in the broadband/telecommunications marketplace. This is because the telecommunications market, unlike that for transportation or utility infrastructure, is competitive. Using public funding for infrastructure that some residents (or local businesses) may not use, or will abandon, is risky as the public will still be required to pay what it has promised. Taxpayers, therefore, become the guarantors of these projects. Still, this model can still be beneficial for local governments that cannot, or will not, take on a large-scale project and instead wish to rely on private expertise and execution.

To fund DBF, DBFM, or DBFMO projects, a locality must guarantee that its private partner will realize a certain amount of revenue. This revenue could be made available by any legal means — revenue derived from end users (e.g. landing station users) or a local tax. A hybrid arrangement is also possible, if allowed by the local tax code. The private partner's payments would be funded partially though a tax, and partially through end-user revenue. In any event, the private partner is able to offset the risk associated with the project. In the event that the project recoups more revenue than anticipated, the agreement between the parties could also provide for revenue sharing.

The most straightforward examples of public-private partnerships involve a local government simply paying a private firm to design and build new infrastructure. These partnerships take the form of design-build-finance (DBF), design-build-finance-maintain (DBFM), and design-build-finance-operate-maintain (DBFOM) arrangements.

Even in the absence of revenue flowing back to the locality, the primary benefit of a publicly-funded model is that by assuming the financial risk, the public gains a say in the relevant business model, pricing structure, and service offerings of the subject facilities. In Hawai'i, this would mean the public could negotiate carrier-neutral access terms, security and disaster recovery requirements, and competitive pricing for small businesses or cable operators that are promoting certain public interest goals.

The commonwealth of Massachusetts followed a DBFMO model to deploy an open-access middle mile network to connect 123 communities in western and central Massachusetts following the government's creation of the Massachusetts Broadband Institute (MBI), an organization intended to increase broadband access and adoption across the state.[55] The project was financed using $45.4 million in federal dollars from the American Recovery and Reinvestment Act and $26.2 million in matching state funds.[56] MBI contracted with a private firm, 4GS, to build the network, and another private firm, Axia, to operate and maintain the network. Any internet service provider, using any technology, was allowed to access the network to provide last mile service. While Axia leased access to last mile providers, MBI controlled the prices Axia could charge ISPs on the network, of which there were nearly two dozen in 2012. A profit-sharing agreement continues to incentivize Axia to enter into as many leasing agreements as possible. The state's share of the profits is used to further expand and upgrade the network, and to fund broadband-related economic development projects. In practice, this model allows the state to both focus on its broader policy goals while still overseeing the infrastructure project that made achieving those goals possible.

While the benefits of publicly funded and privately executed partnership models are appealing, risk remains. The application of P3 models to the broadband infrastructure context is still relatively new; and as stated above, it is unprecedented in the U.S. as applied to an undersea cable landing station — whose correlation to increased access to broadband access and adoption is more attenuated than existing middle and last mile terrestrial fiber use cases. Specific risks include the political and financial risks associated with using public money to fund infrastructure that some taxpayers may not want; hence, there is potential for taxpayer opposition. Additionally, while the state does not necessarily have to issue bonds or go into debt, the financing arrangement can still be considered by auditors and bond markets when evaluating the state's borrowing capacity. Therefore, before committing to a publicly financed partnership model, Hawai`i should carry out careful diligence to ensure that its private partner can generate sufficient revenues to cover the state's investment.

3. Shared investment and risk

In a shared investment and risk model, local governments and their private partners share the capital expenditure, operating, and maintenance costs of new infrastructure projects. Such a partnership can take many forms. In Hawai`i, shared risk partnerships could look like the state contributing all or a portion of the costs to build a cable landing station, as well as making regulatory concessions to facilitate construction, and leasing access to cable operators, while a private partner agrees to operate and maintain the station. In another scenario, Hawai`i might finance the cable landing station while a private partner provides maintenance and operation services and leases access to cable operators. In either scenario, the state and the private partner are free to decide how to best leverage their expertise and extract relative value.

Westminster, Maryland's public private partnership with Ting is one example of a carefully constructed shared-risk initiative. Westminster wanted to build a last-mile fiber network that would connect every residence and business in the town.[57] Local lawmakers sought to have a network that was publicly-owned and open access so that several ISPs could use the network to serve customers. Important background is that Westminster's last-mile network was to connect to the publicly-owned middle-mile network (the Carrol County Public Network, or CCPN) that connected 120

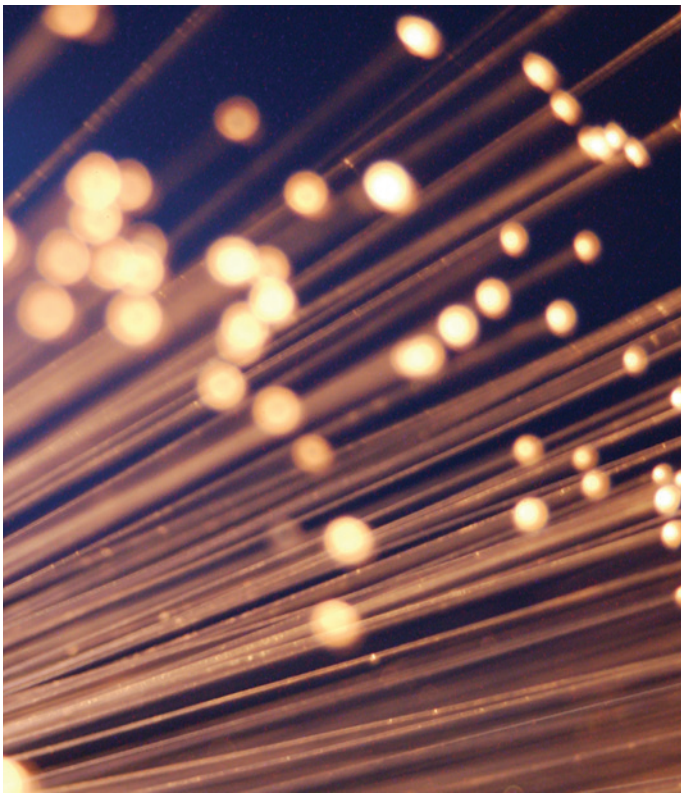
55 Susan Crawford and Robyn Mohr, Bringing Municipal High-Speed Internet Access to Leverett, Massachusetts (2013), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2366044.

56 Id.

57 See generally Robert Wack, The Westminster P3 Model, Broadband Communities Magazine Online (Nov. 2015), http://www.bbpmag.com/MuniPortal/EditorsChoice/1115editorschoice.php.

community anchor institutions throughout the county in which Westminster was located. CCPN was created by a consortium that included the county government, public schools, and the local community college, all of which combined resources to build the middle-mile network. It was the success of the middle-mile CCPN project that inspired, and ultimately enabled, Westminster's last mile network.

The Westminster network began with a feasibility study, the findings of which resulted in two fiber pilot projects (one residential and one commercial) that allowed to city to experiment on a smaller scale before undertaking a larger project. The city funded the pilot phase and authorized construction before securing an ISP partner in order to demonstrate their commitment to the project. The pilot projects were successful and the city therefore authorized spending for a city-wide network. The local government issued a $21 million bond to finance the network before selecting a partner[58] —again demonstrating credibility and commitment going into partner negotiations.



Having secured funding, the city issued a request for proposals for a public private partnership that listed core principles. The first principle was that the network be publicly owned. However, the optical network terminals at each subscriber location would be owned by the partner. In Hawai`i, this could look like a cable landing station being owned by the state, while a private partner owns the networking equipment and interconnection facilities therein. The second Westminster RFP principle was that the private partner manage the network on an open access basis. In Hawai`i, this same principle would apply. However, just as in Westminster, Hawai`i may acknowledge that its partner may require some temporary exclusive rights to make its investment economically feasible. While there was pushback from ISPs in Westminster to the open access requirement, the city's eventual partner, Ting, did agree to the concept with a concession that it could be the sole ISP on the network for two years or until it signed up 3,000 customers, whichever came first. This kind of milestone was a key characteristic of the Westminster-Ting relationship.

Beyond setting broad guidelines that prescribed ownership of the network, and shared responsibilities for maintenance (Westminster), construction (Westminster), network operations, including equipment purchasing and installation (Ting), and customer service (Ting), some requirements changed incrementally based on the achievement of certain milestones.[59] For instance, the city set a baseline lease fee that increased per active subscriber on the network and that began to be adjusted annually one year following activation of the 1500th subscriber. Additionally, the network was constructed incrementally. Westminster maintained ultimate authority over network expansion, but accepted input from Ting based on their research into local demand. Moreover, once a completed segment of the network reached a 20% subscription rate, the city was required to begin the next phase of construction. This approach ensured that both parties were able to keep up with their commitments and that the city's expenditures (and related debt service payments) were aligned with the project's ability to generate revenue. To further mitigate the city's financial risk, both

58 Wiley Hayes, Westminster to expand fiber optic network, CARROLL COUNTY TIMES (Oct. 24, 2015), https://www.baltimoresun.com/maryland/carroll/news/ph-cc-westminster-fiber-second-phase-20151024-story.html.

59 See Columbia Telecommunications Corporation, Public-Private Partner Feasibility Study for Broadband in the North End at 18 (2017), http://www.harfordcountymd.gov/DocumentCenter/View/8749/Harford---North-End-Broadband-Feasibility-Study?bidId= (citing Westminster as a case study for the county's own partnership).

Westminster and Ting are on the hook to pay the city's debt if the project does not yield sufficient revenue. The city must cover the first $50,000 shortfall in a fiscal quarter, and Ting must cover additional payments up to $150,000. Westminster then becomes responsible for all additional debt payments. To protect Ting's investment, if the city decides to abandon involvement with the network and sell it, it must purchase all of Ting's equipment or allow Ting to remove it. Also, the city may only sell the network to a buyer that agrees to allow Ting to continue to lease access to the network. Finally, to protect both parties the agreement renews at the end of its 10-year term only if revenue is 10 percent higher than the outstanding debt obligation.[60] All of these terms — shared liability for revenue or other money-related shortfalls; incremental deployment of subsequent cable landing stations; early termination liability; and protective assignment provisions — can be adapted the cable landing station context to offer protection for Hawaiian taxpayers.

As with most broadband infrastructure public private partnerships, the Westminster-Ting relationship is new and it is too soon to label it a success or failure. As of the fall of 2018, the project's three-year mark, Ting's offering had a 38% take rate. The goal was to hit 40% after 5 years.[61] Therefore, by at least one measure, the partnership appears to be a success. At the end of this year, the network will transition to being open access network, and lawmakers across the country may gain better insight into whether this dynamic model of financing a public infrastructure can offer long term accountability from a private firm. In the sections that follow, we discuss certain key stakeholders in Hawai`i's broadband ecosystem and the roles they may play in determining the state's broadband future and apply learnings from the financing models described above to recommend next steps.

V. Key stakeholders

As highlighted in the Johns Hopkins concept document, building a broadband "megacommunity" is key to completing the proposed cable landing station project.[62] Incumbent cable landing station operators, broadband providers, data center operators, and the public all have much to gain or lose depending on how the initiative is structured, and whether it ultimately succeeds. Below, we provide an overview of key stakeholders that have already demonstrated interest in a cable landing station project or its underlying goals, and that can play important roles in the project's outcome.

A. HAWAI`I EXECUTIVE BRANCH

The Hawai`i Executive Branch, including the Office of the Governor, DCCA, and Department of Business, Economic Development and Tourism (DBEDT) can play leading roles in the cable landing station initiative. Each office has key experience and expertise to offer the project. The Office of the Governor has showed consistent support for broadband deployment initiatives in recognition of the technology's importance to the state's economy,[63] and the governor has specifically offered supportive statements relating to the deployment of recent undersea cables. Ideally, the Office of the Governor would be supportive of efforts to bring new cable landing stations to the state. However, the office must contend with public sentiment and pressure from incumbent providers. Therefore, it is important to demonstrate buy-in from these constituencies and local communities before one can expect public support from the governor's office. DCCA and DBEDT will be critical to liaising with these constituents and imparting lessons learned from past efforts to pass legislation and court private investment.

60 Dark Fiber Lease and Network Operation Agreement between Westminster, Maryland and Ting, http://www.localnetchoice.org/wp-content/uploads/2016/02/Ting-Contract-Executed.pdf (last visited Nov. 21, 2019).
61 Next Century Cities, Westminster and Ting Go Together Like Milk and Cookies, https://nextcenturycities.org/westminster-and-ting-go-together-like-milk-and-cookies/ (Oct. 5, 2018),
62 Johns Hopkins Concept Document at 86.
63 Governor David Ige's Priorities for Hawai`i, https://governor.hawaii.gov/governor-david-iges-priorities-for-hawai%CA%BBi/ (last visited Nov. 14, 2019).

B. U.S. CONGRESS

Hawai`i's representatives in the U.S. Congress serve on key committees responsible for ensuring competitive broadband markets across the country, including the Senate Committee on Commerce, Science, and Transportation Subcommittee on Communications, Technology, Innovation, and the Internet and the Senate Committee on the Judiciary. Both of the state's U.S. senators have introduced legislation to promote broadband access and adoption and have the leadership and expertise to assist in the development of a politically workable approach to a new cable landing station, as well has to represent the state's interests before fellow lawmakers (particularly those from rural states), many of whom are invested in expanding broadband access.[64] Similar legislation in the House of Representatives could also see funds dedicated to rural broadband infrastructure.[65] If adopted, these funds could support construction or maintenance of a cable landing station or stations within Hawai`i.

C. DEPARTMENT OF DEFENSE

As of 2015, there were 163,467 acres of Department of Defense (DoD) land in Hawai`i.[66] Pursuant to the MOBILE NOW Act, DoD, in collaboration with the NTIA and other federal agencies, are to work to streamline permitting on federal lands, including by developing procedures for tracking applications, expediting application review, approval, and renewals, and prioritizing permitting for construction in previously disturbed rights-of-way.[67] DoD was charged with streamlining its permitting processes by November 2019 to encourage private-sector deployment of broadband facilities, which may include a cable landing station,[68] on DoD properties. DoD has yet to release its streamlined process. When the DoD deliverable does become available, Hawai`i may consider replicating procedures that are adaptable to the state permitting processes.

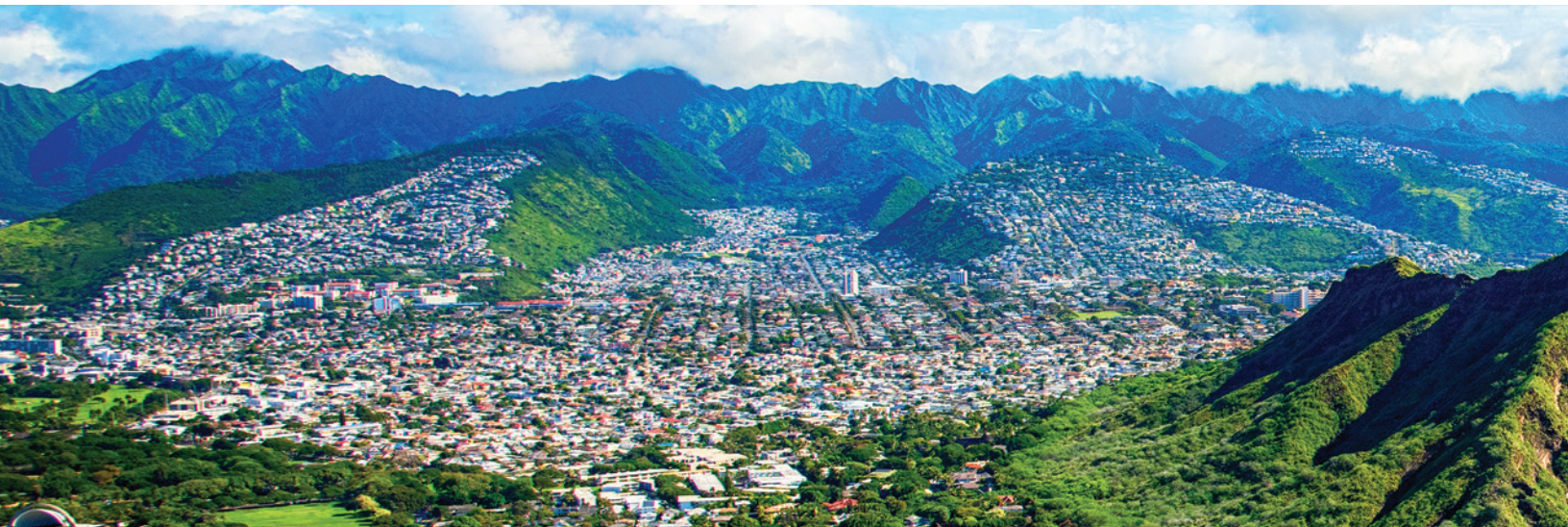
64 In November 2019, Senator Schatz co-sponsored new legislation to raise billions of dollars for rural broadband through an auction of what is called "C-band" spectrum. Schatz's proposal, which is co-sponsored by senators Ed Markey (D-Mass) and Maria Cantwell (D-Wash) would create a fund to address gaps in rural broadband coverage. Press Release, Office of Brian Schatz, United States Senator for Hawai`i, Schatz, Markey, Cantwell Introduce Legislation to Raise Billions for Rural Broadband Public Safety Through Public Auction of C-Band Spectrum (Nov. 21, 2019), https://www.schatz.senate.gov/press-releases/schatz-markey-cantwell-introduce-legislation-to-raise-billions-for-rural-broadband-public-safety-through-public-auction-of-c-band-spectrum.

65 Caleb Henry, House lawmakers, with legislation in tow, push for public C-band auction, SPACENEWS, (Oct. 30, 2019), https://spacenews.com/house-lawmakers-with-legislation-in-tow-push-for-public-c-band-auction/; John Eggerton, Wicker, Thune Introduce C-Band Bill, MULTICHANNEL NEWS, (Nov. 18, 2019), https://www.multichannel.com/news/wicker-thune-introduce-c-band-bill.

66 Congressional Research Service, Federal Land Ownership: Overview and Data a 9 (2017), https://fas.org/sgp/crs/misc/R42346.pdf.

67 United States Departments of Agriculture and Commerce, American Broadband Initiative: Milestones Report: February 2019 at 17 (2019), https://www.ntia.doc.gov/files/ntia/publications/american_broadband_initiative_milestones_report.pdf.

68 Consolidated Appropriations Act, 2018 (P.L. 115-141), Division P, Title VI (MOBILE NOW), Sec. 606(d) (defining "communications facility installation" to include any infrastructure, including any transmitting device, tower, or support structure, and any equipment, switches, wiring, cabling, power sources, shelters, or cabinets, associated with the licensed or permitted unlicensed wireless or wireline transmission of writings, signs, signals, data, images, pictures, and sounds of all kinds")



D. RURAL UTILITIES SERVICE

The USDA's Rural Utilities Service (RUS) is home to three assistance programs established to finance broadband deployment: the Rural Broadband Access Loan and Loan Guarantee Program, the Community Connect Grant Program, and the ReConnect Program. Also, the Telecommunications Infrastructure Loan and Loan Guarantee Program (previously the Telephone Loan Program) funds broadband deployment in rural areas.[69]

Those eligible for Rural Broadband Access Loans include corporations, limited liability companies, cooperative or mutual organizations, Indian tribes or tribal organizations, and state or local governments. Eligible areas must be completely contained within a rural area (or composed of multiple rural areas); at least 15% of the households in the funded service areas must be unserved, no part of the proposed service area can have three or more incumbent service providers; and no part of the proposed service area can overlap with the service area of current RUS borrowers or of grantees that were funded by RUS.[70]

Eligible applicants for broadband grants include most state and local governments, federally recognized tribes, nonprofits, and for-profit corporations. Projects must serve a rural area where broadband service above a specified minimum speed does not exist, deploy free broadband service for at least two years to all community facilities, and offer broadband to residential and business customers.[71]

Eligibility for the ReConnect programs requires at least 90% of the households to be served by a project receiving a loan or grant under the pilot program shall be in a rural area without sufficient access to broadband at a minimum speed of 10 Mbps/1 Mbps. RUS defines "sufficient access to broadband" as any rural area that has fixed, terrestrial broadband service delivering at least 10 Mbps downstream and 1 Mbps upstream. Mobile and satellite service will not be considered in making the determination that households in the proposed funded service area do not have sufficient access to broadband. Funds will be awarded for projects that have financially sustainable business models that will bring broadband to rural homes, businesses, farms, ranches, and community facilities such as first responders, health care facilities, and schools. Eligible entities may qualify for a 100% loan, 50% loan/50% grant, or 100% grant.[72]

To the extent that Hawai`i can successfully articulate how a cable landing station can result in increased broadband access to rural Hawai'i and demonstrate eligibility, the project could qualify for USDA funding. If Hawai`i seeks to take advantage of available funding, a feasibility study should identify how a project could be structured to meet eligibility criteria.

69 Congressional Research Service, Loan and Grant Programs in the USDA's Rural Utilities Service (2019), https://fas.org/sgp/crs/misc/RL33816.pdf.
70 Department of Agriculture, Rural Utilities Service, "Rural Broadband Access Loans and Loan Guarantees," Interim rule, 80 Federal Register 45397-45413, July 30, 2015, available at https://www.gpo.gov/fdsys/pkg/FR-2015-07-30/pdf/ 2015-18624.pdf.
71 Department of Agriculture, Rural Utilities Service, "Community Connect Broadband Grant Program," 78 Federal Register 25787-25795, May 3, 2013, available at http://www.gpo.gov/fdsys/pkg/FR-2013-05-03/pdf/2013-10502.pdf.
72 U.S. Department of Agriculture, Rural Utilities Service, "Broadband Pilot Program—ReConnect Program," Federal Register, vol. 84, no. 37, February 25, 2019, pp. 5981-5983, available at https://www.govinfo.gov/content/pkg/FR2019-02-25/pdf/2019-03163.pdf.

E. NATIVE HAWAIIAN PROGRAMS

The Department of Hawaiian Home Lands aids Native Hawaiians as well as other non-trust land entities. Lands under Section 204 of the Hawaiian Homes Commission Act would be considered trust land.[73] Infrastructure projects must adhere to the federal National Historic Preservation Act for Native Hawai'ians and Native Hawaiian Organizations. During an undertaking,[74] to preserve property eligible historic property or traditional and cultural significance, federal agencies must inform and consult with Native Hawaiian Organizations. Even where a project does not involve eligible historic property, if construction may affect Native Hawaiian Land should include the input of native leaders at the outset, particularly because such lands are historically underserved and they present a meaningful opportunity for tribal communities to participate in the broadband ecosystem.

F. HAWAIIAN ELECTRIC COMPANY

Hawaiian Electric Company (HECO) relies on broadband for power grid modernization efforts, and serves as an infrastructure provider to ISPs that use its poles and other distribution facilities. HECO has expressed support for a state-supported carrier neutral cable landing station in furtherance of these efforts. Additionally, HECO has previously proposed connecting the Hawai'ian islands' electric grids using an undersea cable, a project that would require the approval of the Hawai`i Public Utilities Commission.[75] A 2013 DBEDT report determined that HECO could not assume the risk of a full-fledged undersea cable connection project. However, the cable landing project requires significantly fewer capital expenditures. Therefore, given HECO's previous interest, DBEBT should revisit the economic feasibility of HECO assuming at least a portion of the risk associated with a cable landing station in furtherance of its renewable energy objectives.

73 U.S. Department of Interior, Mao of Hawaiian Homelands, https://www.doi.gov/hawaiian/home-land-maps (last visited Nov. 2, 2019).
74 Section 106 of the National Historic Preservation Act. (16 U.S.C. 470f).
75 Duane Shimogawa, Hawai`i undersea cable project still on the table, HECO report says, PACIFIC BUSINESS NEWS (Feb. 24, 2016), https://www.bizjournals.com/pacific/news/2016/02/24/hawaii-undersea-cable-project-still-on-the-table.html.

One theme among state and municipally funded broadband infrastructure projects is leadership from the top. In Kansas City, Westminster, Maryland, and in Massachusetts, state and local executive leadership vocally supported their respective projects.

G. OCEAN NETWORKS

Ocean Networks is planning a submarine cable system that will connect Oahu to South America, Central America, and Naples, Florida — named the South America Pacific Link, or SAPL.[76] Ocean Networks has expressed concerns relating to the permitting process and cost of connecting a landing station to a data center. To address these concerns, the provider has lobbied the state to fund a carrier-neutral station that provides the necessary connectivity to a data center operated by DRFortress.[77] To date, Ocean Networks has positioned itself as the most obvious choice as a partner in a public-private partnership arrangement.

H. DRFORTRESS

DRFortress is a carrier-neutral data center provider operating in Hawai`i. It serves as the Hawaiki's cable lading station operator for its carrier-neutral station in Kapolei. DRFortress also operates a neutral data center in Oahu where cable systems meet. Its datacenter was home to AT&T, CenturyLink, Hawaiian Telecom, Level 3, Pacific Data Systems, Spectrum, and Telstra.[78] Therefore, DRFortress has demonstrated that it has the interconnection capabilities that are critical to leveraging a cable landing station to support last-mile broadband. Ocean Networks has argued that a state-supported landing station that connects to the DRFortress data center represents a feasible path forward.[79]

VI. Recommended approach

One theme among state and municipally funded broadband infrastructure projects is leadership from the top. In Kansas City, Westminster, Maryland, and in Massachusetts, state and local executive leadership vocally supported their respective projects. Therefore, **as a first step**, we recommend outreach to Executive Branch agencies and key Congressional members to seek their leadership for a renewed cable landing station. Their involvement throughout the process can instill confidence in the private sector that the necessary appropriations can be made; and can instill confidence in the public that an eventual private partner will be held accountable.

Second, DBEDT would collaborate to develop a feasible, strategic approach to the cable landing station initiative. This would include identifying all potential sources of funding that are available in the near term, including federal government assistance. For example, state funds could come from general obligation bonds, revenue bonds, Certificates of Participation[80], taxes, or loans. To the extent the cable landing station will be directly tied to rural broadband deployment, economic development, or energy projects, federal funds may be available from the USDA, Department of Energy, Economic Development Administration, Department of Commerce, or the Connect America Fund. Based on guidance from the Hawaiian Executive Branch partners, DBEDT, JP Morgan and Dentons may identify which funding sources are feasible. Once available sources of

76 Ocean Networks, oceannetworks.com, (last visited Dec. 1, 2019).
77 Testimony of Scott Schwertfager, CEO, Ocean Networks presented before the Hawai`i House Committee on Economic Development & Business and House Committee on Intrastate Commerce at 1 (Feb. 6, 2019) (Schwertfager Testimony).
78 Letter from Rosa White, CFO, DRFortress, to the Honorable Kymberly Pine, Hawai`i Councilmember and Chair, Committee on Zoning and Housing at 1 (Aug. 23, 2017).
79 Schwertfager Testimony supra note 60.
80 Internal Revenue Service, Introduction to Tax-Exempt Bonds at 12, https://www.irs.gov/pub/irs-tege/teb_phase_1_course_11204_-2module_a.pdf (last visited Dec. 1, 2019).

funding have been identified, Dentons and JP Morgan would identify partnership models that align with then-existing financial and political realities. The appropriate model will depend on available funding, the state's priorities, the feasibility of relaxing or streamlining permitting and other regulatory requirements, how different business models are regulated, and organizational, governance, and other concerns relating to through what legal entity the state would participate in a public-private partnership.

Third, the Hawai`i Legislature would enact measures to create the agreed upon regulatory framework for the initiative, including the approval of funding and any permitting or other access and land use requirements.

Fourth, with financing approved, and an investment-friendly regulatory framework in place, the state will be in the best position to secure a private partner and begin negotiating an agreement, which should take into consideration the public's risk tolerance, the responsibilities it is willing and able to undertake, the rewards it seeks, and how important each of the above are to the outcome of the project. Given their experience with the state's broadband initiatives and strategic plans, we recommend that DBEDT oversee negotiation of any agreement and related implementation activities.

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CSBrand-22211-JP Morgan Whitepaper-8 — 21/01/2020