INTERNET FOR ALL

GUAM

Office of Infrastructure Policy and Development
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National Telecommunications and Information Administration

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Internet For All

1. Executive Summary

Buenas yan Håfa Adai! In this strategic five-year plan, Guam's Office of Infrastructure Policy and Development has set a tangible goal — to ensure every islander, no matter their location or income, has access to free high-speed public internet or an affordable private broadband service. It's a straightforward commitment: connectivity for all. OIPD's roadmap touches on every facet needed to make this happen, from supporting underserved communities and building a stronger infrastructure to aligning with the Broadband Equity, Access, and Deployment (BEAD) program standards. Together, let's make certain that Guam's digital future is both inclusive and forward-looking.

To effectively implement this plan, we first look at the present state of broadband and digital inclusion in Guam, scrutinizing existing programs, partnerships, and infrastructure. We've carried out a thorough needs and gaps assessment to help us pinpoint where our actions are most needed.

Acknowledging and overcoming obstacles are key aspects of our approach. We understand that barriers—be they technical, geographical, regulatory, or financial—exist. But instead of letting these hurdles hinder us, we're ready to tackle them head-on with creative and sustainable solutions.

Addressing challenging topics such as pricing disparities, service reliability, and the economics of broadband is not just a choice but a necessity for shaping the goals of our five-year strategic plan. This effort also includes planning and implementing free wireless home internet and affordability to ensure that high-quality broadband is accessible to everyone. While critiquing these factors may seem like a delicate balancing act, it's crucial to refine our strategies and identify areas for collaborative improvement. We recognize the irreplaceable role that our carriers play in this endeavor: constructive criticism is not a barrier but a catalyst for a stronger partnership and shared goals in eliminating the digital divide while advancing us all.

The success of our plan hinges on a detailed implementation strategy. This plan includes engaging stakeholders, outlining priorities, scheduling planned activities, and providing a timeline for universal service. To ensure smooth execution, we've included a section on technical assistance to provide necessary resources and support.

While our plan provides a roadmap, its success completely depends on collaboration. We plan to dialogue with the Guam Legislature to craft enabling legislation that will move our goals forward, Mayors to facilitate on-ground execution, Utilities to ensure infrastructural synergy, and Carriers to deliver top-notch service as they've strived to do

for decades. With the collective insight of all these stakeholders and the community's support, internet service for all is not a wishful thought, but an attainable goal that will place Guam in the forefront of broadband capabilities now and in the future.

With this comprehensive plan, we're committed to delivering a reliable, inclusive, and sustainable digital infrastructure for the people of Guam.

2. Overview of the Five-Year Action Plan

2.1 Vision

Powered by the Bipartisan Infrastructure Act and the momentum of NTIA's BEAD and Digital Equity programs, we're setting a clear mission for Guam. We aim to ensure every islander enjoys accessible, affordable, high-speed internet, strengthening our ties to the broader digital world while reinforcing our role in America's defense. As we navigate this journey, we're committed to narrowing a digital divide that currently feels as expansive as the Pacific itself.

For Guamanians, the ***'digital divide'*** isn't a distant concept; it's a tangible disadvantage resulting from our remote location, the high cost of internet access, and the missed opportunities these factors create. This divide poses a significant obstacle to equal opportunities across various aspects of life, spanning education, healthcare, and employment. It particularly impacts K-12 students who lack access to crucial developmental tools available to their peers in better-connected areas. In today's world, where remote work and digital literacy are not just possibilities but essential components of daily life, the unavailability of immediate and affordable high-speed internet places our entire community at a competitive disadvantage. Our strategic five-year plan aims to dismantle these barriers and usher in a more inclusive, digitally-connected society.

1. Closing the Latency Gap by Bringing the Internet to Guam by constructing a Green, Tier 4 Data Center that will serve as a world-class IXP.
2. Invest in both terrestrial and undersea broadband infrastructure that either belongs to Guam's people or is managed by an entity that can demonstrate its ability and commitment to serve the long-term needs of Guam's people through increased affordability, improved access, and assured resilience.
3. Invest only in broadband infrastructure solutions that contribute to internet resilience, sustainability, and–where possible–upgradability.
4. Ensure long-term, affordable gigabit access for all community anchor institutions that serve Guam's people and culture.

5. Promote infrastructure investments and internet policies that ensure a continuously healthy and well-regulated marketplace for participating network service providers.
6. Invest in digital equity activities that improve digital literacy and accessibility, high-tech economic opportunities, digital health, digital citizenship, and digital preservation and dissemination of indigenous culture for all Guamanians.
7. Develop strategies to bridge the digital divide that denies citizens full access to services, information, and opportunities due to economic disparities in the community.
8. Promptly Investigate, analyze, and report to Guam's people regarding the technical, economic, and social factors that affect their internet access, affordability, and safety.

Guam's major internet issue is cost. The public pricing of these offerings is far higher than what typical American households pay for both basic and premium levels of service.[1] From a performance standpoint, poor average upload and download rates compared to national standards and large swathes of underserved neighborhoods in Guam are matched by high latencies that interfere with the everyday use of modern, real-time applications. These disadvantages will increasingly hold back Guam's progress as these applications become an increasing part of global economics and daily life for every Guamanian.

The program defines a population as 'Served' with affordable internet access greater than 100 Mbps download, 20 Mbps upload, and below 100 ms latency. Today, this basic level of service is out of reach for most Guamanians – this is no longer acceptable and must be addressed.

We expect to expand on these investments through local opportunities, public-private partnerships, and additional opportunities with NTIA and other federal partners. We anticipate coordinating as a full partner with the Department of Defense as they continue adapting to our unique local security conditions. Guam is the most far-flung land on American soil, an extremely important strategic operating base. It plays a major role in the United States' national security in the Indo-Pacific region.

Immediately after Typhoon Mawar moved past Guam, the island found itself with an almost total collapse of telecom carrier service, disrupting islandwide emergency response and post-typhoon restoration activities. The government is committed to working towards complete recovery from Typhoon Mawar by 2025. We envision a Guam, in five years or less, where affordable qualifying internet service is available for all residents. A Guam with anchor institutions that can afford to serve their communities with gigabit internet and the programming made possible through that

[1] https://www.fcc.gov/ecfs/search/search-filings/filing/108261508110305

internet capacity. A Guam that leads the Pacific in digital equity and opportunities for its people and digitization to help its native language and culture last for many generations. A Guam with internet and communications service that can withstand whatever natural disasters the physical climate may unleash; or threats the global political environment might give rise to. And, finally, a Guam with faster, lower-latency internet for all residents.

By realizing this vision, Guam will be safer, more secure, and more successful as we move towards unparalleled technological advancements in broadband. While the well-being of Guamanians is the primary focus of the Government of Guam, it is worth noting within the context of our federal partners that the well-being of Guam is one of the most cost-effective measures in which the United States can enhance its security position in the world.

Governor Lourdes A. Leon Guerrero, described it succinctly, "Infrastructure is Defense." Indeed, in the aftermath of Guam's recent Typhoon Mawar disaster, the criticality of all Guam infrastructure–including its broadband infrastructure–has never been clearer. Apparently (but not assuredly) by coincidence, Mawar swept onto Guam's shores just as one action by a state actor, China's attempted hack of key Guam government systems, was discovered. At the same time, another incident of questionable providence, the SEA-US undersea cable service interruption, was in progress as the storm made landfall. While one might consider these events a forewarning about the vulnerability of Guam and its infrastructure, those in positions of responsibility must point out that if there is indeed some future conflict with China, that conflict has *essentially already commenced* on Guam.

As America rapidly shifts its national defense priorities to deliver an unprecedented military build-up on the island, Guam's government has had to reassess and reorder its own infrastructure priorities – both to mesh with the defense build-up itself, as well as to plan for new modes of resilience for the local population. In light of the Typhoon, new evaluations and priorities will be necessary.

Both the disaster and the military build-up significantly impacted broadband infrastructure in Guam. The complex and unregulated environment for undersea fiber carriage of internet service from American network backbones makes disaster and resilience planning for civilian internet nearly impossible in an operational theater that recently joined the global threat surface for aggressive acts.[2] The lack of redundant

[2] https://apnews.com/article/matsu-taiwan-internet-cables-cut-china-65f10f5f73a346fa788436366d7a7c70, https://www.atlanticcouncil.org/blogs/new-atlanticist/cord-cutting-russian-style-could-the-kremlin-sever-global-internet-cables/

undersea fiber optic cables devoted specifically to serving the population of Guam is a related concern.

From a ground-based standpoint, Guam's network service providers must unite over shared, foundational security protocols. The state of fierce competition and culture of confidentiality among companies has made collaboration difficult. Yet, our continuous and increasingly cooperative engagement with carriers gives us confidence that this landscape can shift.

In the heart of the Pacific, Guam grapples with challenges that no other U.S. state faces. By leveraging funds from the Bipartisan Infrastructure Act, including the NTIA's BEAD and Digital Equity programs, we are determined to establish a pioneering digital infrastructure that addresses these unique challenges and meets the evolving needs of our community. Recognizing our singular position and the necessity to innovate makes our ambition clear: to ensure affordable, resilient, and state-of-the-art internet access for all, now and in the future. By confronting and addressing these unparalleled challenges head-on, we are setting the stage for Guam to emerge as a beacon in this region, a leader and mentor of digital innovation and resilience, charting a course others may follow.

The ambition of this plan matches the aspirations we hold for the people of Guam. While the strategies we've outlined might evolve, our unwavering belief remains that we can and will achieve our goals.

2.2. Goals and Objectives

Develop a Self-Sufficient Broadband Infrastructure: Internet access is the backbone of modern society. We plan to build an enduring broadband network encompassing a Data Center that is connected to the public-owned middle-mile architecture and which is accessible to all Internet Service Providers through public-private partnerships that can improve network latency, meet the needs of the unserved and underserved, and address affordability while offering consistent, reliable internet connectivity.

Deliver Affordable, High-Speed Internet: We believe in an equitable digital future where everyone has access to the Internet, irrespective of their financial circumstances.

Free Public Islandwide Service: Experts from nearly all carriers have expressed that our goal of providing public universal connectivity to every home is a tangible goal we can achieve sooner than many anticipate. The determining factors will be selecting the right technology and the necessary investments to bring this vision to life.

Elevate the Internet Speeds Across Guam: We're dedicated to delivering not just any internet access but fast, efficient, and reliable connectivity. By continually assessing and improving our internet speeds, we'll ensure Guam stays connected at a pace that matches the rest of the world. We will tackle Guam's unserved status due to high latency, meaning better real-time access, better experience, expanded work opportunities, and enhanced telemedicine.

Nurture a Skilled Workforce: Maintaining a reliable broadband infrastructure requires a dedicated, skilled workforce. We will create job opportunities by collaborating with local vocational institutions, institutions of higher learning, and government entities, to set up training cooperatives to build workforce capacity as Guam sets the groundwork to build its internet infrastructure's long-term workforce.

Facilitate Participation in the Digital Economy: The digital economy is a powerhouse of opportunities, from e-learning to e-commerce. By offering comprehensive digital literacy programs, we are equipping every resident of Guam with the necessary skills to participate and benefit from this digital revolution.

Navigate Regulatory Challenges: Regulatory processes can often seem like a daunting labyrinth. We are committed to actively liaising with policy-makers and regulatory bodies to ensure our broadband expansion plans move forward smoothly, unimpeded by unnecessary obstacles.

Champion Equitable Access: Our mission is to ensure that everyone in Guam has equal access to high-quality, high-speed internet. No one should be left behind because of their location, financial status, or other factors.

Adhere to Federal BEAD Program Requirements: Federal funding comes with its own set of prerequisites. We are prepared to comply meticulously with the BEAD program. Our commitment to transparency and accountability will guide our actions as we bring the vision of a digitally connected Guam to life.

2.3 Our Pledge to Guam

We are fully committed to enhancing internet services in Guam. Our strategy is more than a plan; it's a pledge driven by the belief in the transformative power of connectivity. Balancing all islanders' input with data-driven evidence, we approach our mission with unwavering resolve. In the face of challenges, our focus on access, affordability, and quality remains steadfast, without preference. We will not waver in our pursuit of a connected and empowered Guam.

Evidence-Based Decision Making: Any alteration or shifting in our goals related to access, affordability, speeds, and better internet for Guam must come from rigorous evidence that we should change the course. Our experience teaches us that unchecked data usually leaves Guam behind. If we are to stray from better service efforts for our people, transparency and full disclosure are essential; these changes must undergo rigorous counter-testing to find the truth about Guam's current internet service.

Community Input: Decisions around these critical areas must involve robust community input. The people of Guam must have a say in shaping their internet services, and this community perspective will ensure that decisions align with real-world needs and priorities. We will engage directly with residents village by village to hear what they have to say about the true state of their service.

Partnership Instead of Posturing:
From the outset, we've engaged carriers in individual, confidential discussions to ensure that our action plan is as informed as possible. We understand the competitive nature of their businesses and have created spaces for candid feedback. Rest assured, their voices are heard, and their contributions to Guam are respected; an equitable plan also demands that community stakeholders have an equal seat at the table.

This is not a zero-sum game where one party's gain is another's loss. Victory, in this context, is universally improved access to fast, reliable, and affordable internet, regardless of location or income level. The goal is to foster a climate of collaboration and transparency, aligning all stakeholders in a concerted effort to elevate the digital quality of life for the people of Guam.

Seeking More Funding to Support ACP:
Guam has made significant progress in securing funding for high-speed internet adoption through BEAD and Digital Equity, but our efforts don't stop here. OIPD is actively pursuing additional resources to promote the Affordable Connectivity Program (ACP).

Recently, OIPD received notification of an allocation of $383,000 in funding from the FCC to enhance the promotion of the ACP. Despite outreach efforts by internet service providers to reach eligible Guamanians, we have only seen 1,324 ACP subscribers, (as of this writing, June, 2023), which is among the lowest figures in the nation and falling significantly short of the number of eligible residents.

We aim to utilize these funds to ensure that eligible households for this benefit are well-informed about their eligibility through their carriers.

Alignment with Guam's Priorities: The BEAD strategy must align with Guam's unique selection of priorities, reflecting its specific context and challenges. This alignment ensures the plan is tailored to Guam's situation, making a more effective and community-driven approach to decision-making in these critical areas to ensure that changes are made judiciously and that they truly serve the people of Guam.

Beyond the Fabric: It is essential to recognize that the national map used for BEAD, known as FCC Fabric, is primarily based on incomplete data and carrier claims of available marketing speeds. This method has proven insufficient, a concern that has been nationally recognized. ***Looking at the fabric incorrectly can lead to the false conclusion that Guam is 100% 'served'— which was an assumption that the federal government had deliberated then resoundingly rejected.*** The accurate picture of 'served and unserved' means the community should be the guiding principle in our decision-making when weighing projects. Despite the Fabric being the FCC's best efforts at the time, existing maps need to be revised, relying on incomplete data and unchecked reported marketing from carriers. The situation on the ground in Guam must take precedence, focusing on the welfare of the people rather than on inaccurate data.

At one point the FCC Fabric presented Guam as 100% served, despite only having 12% of the map complete. While inaccurate, the Fabric had to be our starting point by statute.
This commitment to accuracy has led not only the Governors of the Pacific Territories to contest the FCC Fabric's conclusions officially, but also the Guam carriers who submitted the data in the first place. Some carriers, acknowledging the shortcomings in the fabric, actively contributed to refuting the FCC Fabric's accuracy. Their involvement underscores the importance of ensuring that our understanding of internet accessibility in Guam is grounded in reality and not in unreliable methodologies.

BEAD Fund Priorities:
Guam is considered fully unserved because of latency. As the community has told us, access is only possible with affordability. The NOFO addresses the issues related to

affordability under the BEAD program, which needs to be considered a priority. Also, the figures of what some call 'fully served' that are provided, must be critically analyzed considering the FCC's shortcomings in mapping the Pacific territories, including Guam.

Our choice to pursue a data center is based on the consensus of engineers and experts who agree that a linked public-private partnership of other smaller data centers, anchored by a robust Tier 4 Green Data Center is the best limited option. We must give Guam its best shot. FCC Maps used for the analysis do not accurately depict the situation in Guam. Our focus on latency is important but is secondary to the real need for affordable and reliable access to underserved areas. Solutions that serve people rather than just technical milestones should be sought.

In creating U.S. based content delivery networks (CDNs) in Guam to improve latency to U.S. content for Guam's residents, we firmly commit to focusing our efforts on enhancing access to websites and sources that our community visits. Unlike measurements against hosts in non-English speaking countries, our priority is ensuring seamless access to sites used in the U.S. mainland, such as Amazon.com, not for example, Amazon.co.jp or Amazon.cn. Measuring latency to new CDNs with content on U.S. soil, we believe, will best serve our people.

Unserved and Underserved Locations:
Unserved means service under 25 Mbps down, 3 Mbps up, and sub-100ms latency. Another definition of unserved is not getting what you pay for or if you can afford it at all. Recommendations for improving broadband to unserved and underserved locations and addressing Community Anchor Institutions (CAIs) needs are welcome. We intend to take a community-centered approach, prioritizing technical requirements and existing infrastructure. Post-allocation, we will determine our challenge process and our mapped priorities. There is a need to focus on community needs, education, access, and affordability, considering the actual situation in Guam, not merely what is shown in potentially faulty maps.

Consideration of Alternative Eligible Uses
Our focus must be on genuinely assessing community needs and prioritizing latency, speed, and affordable access. Collaborations with local institutions, community involvement, and transparent decision-making must guide the allocation of funds. We also see other projects best handled by concurrent Digital Equity Capacity grants, proposed and transparently procured without business influence.

Hierarchy of Projects
More cooperative approaches that involve community engagement, transparent processes, and prioritizing human welfare over technical and business interests are

essential. The primary emphasis must be on the people of Guam, their real needs, and the gaps in service that exist, rather than relying on possibly misleading data and focusing solely on technical aspects. Cooperation, community engagement, and a focus on affordability must be at the forefront of any proposals and actions.

We recognize that everyone in our community is classified as 'unserved.' We intend to change this, and we're willing to explore all means to do so. Whether it's expanding wireless access, building out fiber-to-home connections, understanding the importance of the 'last mile' build-outs, or embracing innovative solutions that may arise, we are committed to ensuring that every Guamanian has access.

After a year of discussion with the FCC, we know all too well that bad data and misplaced priorities can take us off track. But by staying focused on affordability, cooperation, and community engagement, we're ensuring that every proposal and every action we take is aligned with what's best for Guam.

In our steadfast pledge to Guam, we focus on genuine community needs, prioritizing access, affordability, and quality of internet service. We are confident that our partners agree. We proceed without preference, guided by evidence and transparency, to ensure that we meet Guam's unique challenges head on.

3. Current State of Broadband and Digital Inclusion

3.1 Existing Programs

Activity Name	Description	Intended Outcome(s)
State Digital Equity Plan	Ongoing	Guam's First Digital Equity Plan, with programs ready for prioritization under Capacity.
Stakeholder Outreach	Digital Equity	Meeting with groups of those who can be most affected by the advent of Digital Equity Programs. Fact-finding and communicating. Separate meetings for ISPs.
Digital Navigator Pilot	Digital Equity	OIPD Staff working with Medical Clinic to assist with digital customer service and translation.

Table 2: Current Activities that the Broadband Program/Office Conducts

Activity Name	Description	Intended Outcome(s)
Five-Year Plan	Creation of the Five-Year Plan	Setting forth the specific goals for the BEAD and Guam Broadband Initiative
Organizational Development	Office Creation	Organizational capabilities to meet the new demands of the Five-Year Plan.
Federal Compliance	Federal Compliance & Training	Federal grant compliance ensures the appropriate and intended use of federal grant funds by following set rules and regulations.
GIS Mapping	Island Broadband Mapping	Analyzing FCC Broadband Fabric and managing the challenge process.

Stakeholder Outreach	Digital Equity	Meeting with groups of those who can be most affected by the advent of Digital Equity Programs. Fact finding and communicating. Separate meetings for ISPs.

Table 2: Current and Planned Full-Time and Part-Time Employees

Current/ Planned	Full-Time/ Part-time	Position	Description of Role
Current or Planned	FT or PT	Position	Brief description of role
Current	FTE	BEAD Administrator	Documentation, meeting management, handling project budgets, and using time management skills to help the team stay on track. Strategic planning. Allocating Financial resources, tracking expenses, and ensuring the program achieves goals.
Current	PTE	Infrastructure Coordinator	Head of Overall Broadband Office, dedicating half of the usual duties as overall Infrastructure coordinator to provide cooperation between the executive branch and the program and key in high-level outreach to other agencies and partners.
Current/ Planned	**Full-Time/ Part-time**	**Five-year Plan Position**	**Description of Role**
Planned	FTE	Broadband Office Director	Office planning and execution
Current	FTE	BEAD Administrator	BEAD project oversight, milestones, compliance, marketing
Planned	FTE	Program Manager	Interagency Coordination

Planned	FTE	Digital Equity Manager	Execution of digital equity strategy within BEAD
Planned	FTE	Community Affairs	Communication with covered groups and other outreach
Planned	FTE	Network Specialist	Technical support
Planned	FTE	Marketing Manager	Graphics, Web Updates, Promotional Materials, and Commercial outreach
Planned	FTE	Workforce Development Manager	Lead for enacting and overseeing workforce development.
Planned	FTE	Administrative Assistant	Support to the Broadband Office Director and Program Administrator.

Table 3: Current and Planned Contractor Support

Current/ Planned	Time	Position	Description of Role
Current or Planned	FT or PT	Contractor Position	Brief description of contractor's role
Planned	PT	Technical Advisor	SME who provides expert guidance, support, and troubleshooting, and assists with evaluating technical products, systems, or proposals.
Planned	PT	Web Developer	Web developers create and maintain websites. They are also responsible for the site's technical aspects, such as its performance and capacity, which are measures of a website's speed and how much traffic the site can handle. In addition, web developers may create content for the site.

Table 4: Broadband Funding

Source	Total	Expended	Available
Name of federal agency/ other source of funding	$X,000,000	0	$X00,000
USDA	$29,767,3520	Unknown	Unknown
NTIA	$1,250,000	$77,000	1,250,000
NTIA	$150,000	0	0
NTIA	$12,770,692.18	0	0
NTIA	$156,831,733.59	0	$156,831,733.59

3.2 Partnerships

The Guam Office of Infrastructure Policy and Development enjoys strong partnerships with various entities. By positioning within the Guam Office of the Governor, the OIPD is positioned to collaborate with other government agencies and entities, local entities, and institutions of Guam. Broadband is no exception to this, with several strong partnerships critical to the Office's planning and development for internet deployment and adoption. Office of Infrastructure Policy and Development Partners will be consulted in every Stakeholder Engagement phase (see Section 5). Each partner will be encouraged to designate a representative for the broadband team to provide communications, activity coordination, and document draft reviews when needed.

We recognize the essential role of collaborating with Guam's Internet Carriers. We've actively sought their guidance and engaged in discussions that only industry insiders genuinely comprehend. It's reassuring that they share our commitment to ongoing dialogue, understanding that constructive conversations are critical, even amidst differing viewpoints, all contributing to Guam's advancement.

Our approach to partnership and outreach is deeply rooted in the belief that collaboration is the cornerstone of meaningful progress. We understand that addressing digital equity challenges requires a collective effort encompassing a wide range of stakeholders. Our philosophy is all about forging dynamic connections and fostering inclusivity.

We value partnerships across different sectors, from carriers and governmental bodies to educational institutions and cultural preservation agencies. This demonstrates our

commitment to involving diverse perspectives, expertise, and resources in our journey to achieve digital equity.

Our outreach efforts are characterized by their adaptability and responsiveness. We meet our partners where they are, whether through virtual meetings, in-person gatherings, or mass media platforms. This flexible approach underscores our dedication to engaging with stakeholders in a manner that suits their preferences and needs.

Transparency and two-way communication are integral to our philosophy. Through discussions, fact-finding sessions, and information-sharing events, we create spaces for open dialogue. This not only enables us to communicate our vision and plans but also empowers our partners to voice their concerns, ideas, and needs.

Our philosophy further recognizes the interconnections among various sectors. By engaging with utility agencies, veterans' offices, the medical community, and more, we acknowledge that digital equity has far-reaching implications that extend beyond just internet access. This holistic perspective drives us to work collaboratively across boundaries.

In essence, our philosophy of partnership and outreach is a journey toward a more connected and equitable future. It's centered on the idea that progress is achieved through collective action, diverse voices, and a shared commitment to making a positive impact.

3.2.1 Partners

Partners	Description of Current or Planned Role in Broadband Deployment and Adoption
Guam Office of Technology	The Guam Office of Technology (OTECH) is responsible for "enhancing GovGuam's technical infrastructure to attract business, improve access to information, and enhance educational opportunities for our children and future generations." OTECH is Guam's leading consumer of dark fiber and other network services, providing internet across Guam to many government and quasi-government agencies. OTECH is a frequent partner and advisor in meetings and information-gathering efforts and is vital to any cybersecurity evaluation of terrestrial networks in Guam that may be required to accomplish the Five-Year Plan.

Guam's Internet Service Providers (ISPs)	Guam's carriers have long been more than just service providers. GTA Teleguam, Docomo Pacific, IT&E and Pacific Data Systems have increasingly been part of the discussion since 2021. Their decades of business on the island have made them reservoirs of invaluable expertise. As we map out the digital future for Guam, their insights, born from years of hands-on experience, are crucial. Impressively, they've often provided advice even when it doesn't directly boost their bottom line. It's clear: their commitment runs deeper than business. As we aim for a more connected Guam, tapping into their institutional knowledge isn't just wise—it's essential.
Judiciary of Guam	The Judiciary's purpose is to administer justice by interpreting and upholding the laws, resolving disputes in a timely manner, and providing accessible, efficient, and effective court services, with an increasing reliance on digital communication and the internet to enhance accessibility and streamline processes. The Judiciary of Guam is the designated state agency responsible for the Criminal Justice Information System (CJIS)/National Crime Information Center (NCIC) that supports federal and local law enforcement agencies with the disposition of local and federal criminal cases.
Mayors Council of Guam	The Mayors Council of Guam (MCOG) is the key entity for local coordination in Guam. While Guam is too small to have extensive government build-out at a local level, the Mayors serve as a "catch-all" at the local level for civic engagement and listening, initiative roll-outs, and general door-to-door government efforts. MCOG will be key in helping the Office of Infrastructure Policy and Development broadband team communicate with residences and tailoring messaging and solutions that resonate locally.
Guam Department of Chamorro Affairs	The Guam *Dipattamenton I Kaohao Guinahan Chamorro*, also known as the Department of Chamorro Affairs or DCA, will be a strong partner for the Office of Infrastructure Policy and Development to ensure that the solutions for broadband deployment and adoption are compatible with maintaining the indigenous character of Guam. As the managing entity of Guam's Public Library system, DCA will have a crucial role in the development and execution of Digital Equity plans. In reviewing the development of Guam's Five-Year Action Plan and programming, DCA will

	be essential in identifying and eliminating any aspects that might otherwise fail to serve the primary role of Guam's indigenous peoples in managing and inhabiting the island.
Guam Department of Labor	Guam's Department of Labor (DOL) is responsible for labor administration and enforcement in Guam. It additionally promotes workforce development and engagement activities, including hosting the American Job Center (AJC), Guam's central facility for employment, training, and related services. AJC provides job seekers, students, and businesses access to a convenient, reliable, and up-to-date broad range of coordinated employment, training, and educational service, program information, and resources. It will be critical for the Office of Infrastructure Policy and Development to engage with Guam DOL to coordinate hiring and workforce issues for BEAD and on workforce development topics central to Digital Equity programming.
Guam Chamber of Commerce	The Guam Chamber of Commerce "seeks to develop, enable, promote, and protect the interest of all Guam businesses; and to be the catalyst for sustainable economic growth that improves the quality of life in Guam." Working through the Chamber of Commerce will allow the Office of Infrastructure Policy and Development to connect with local businesses who cater to all segments of the population. This communication will be crucial for both Digital Equity and BEAD efforts to promote a better economic environment for Guam.
University of Guam	The University of Guam (UOG) mission statement, *Ina, Deskubre, Setbe* is Chamorro for "to Enlighten, to Discover, to Serve." As the largest and premier post-secondary institution in all of Micronesia, UOG attracts learners from dozens of islands and stands as a critical hub for regional education and research. Its role in broadband adoption, digital literacy, digital citizenship, and equity of all forms is central to Guam. The Office of Infrastructure Policy and Development will make special efforts to engage on a regular basis with UOG.UOG can also be a valuable resource for promoting subsidy programs such as the Affordable Connectivity Program, which would likely apply to many of its enrollees seeking internet service at home.
Guam Community College	Guam Community College, or GCC, is Guam's leader in career and technical skills development for post-secondary

	and non-traditional learners in Guam and from neighboring islands. GCC's programming includes basic adult literacy, Adult High School Diploma, English as a Second Language (ESL), and other educational offerings to help transition learners into new positions in Guam's socio-economic fabric. The connections between Guam Community College and Digital Equity are clear. GCC can also be a valuable resource for promoting subsidy programs such as the Affordable Connectivity Program, which would likely apply to many of its enrollees seeking internet service at home.
Guam Department of Education	The Guam Department of Education (GDOE) has primary responsibility for preparing Guam's residents of the future–our children–to participate in an ever advancing digital world. As of 2023, the Guam Department Of Education School District manages 41 public schools, representing nearly every neighborhood in Guam and serving 27,497 students. GDOE is also one of the island's largest internet service and computing consumers. As a result, GDOEs participation in BEAD and Digital Equity planning is a priority for the Office of Infrastructure Policy and Development.
Guam Memorial Hospital Authority	The Guam Memorial Hospital Authority (GMHA) stands as a pillar of Guam's medical community. As the primary civilian hospital on the island, it serves the most Guam residents, providing essential healthcare services to people from all walks of life. GMHAs commitment to offering quality care to everyone, regardless of their ability to pay, reinforces its central role in the health and well-being of the island's population.
Guam Behavioral Health and Wellness Center	The Guam Behavioral Health and Wellness Center (GBHWC) is the primary government agency in Guam responsible for mental health and substance abuse treatment services. During the pandemic, GBHWC demonstrated the essential potential of telemedicine by rapidly adapting its services to remote formats, allowing continued access to care even under restrictions. This transition not only helped maintain continuity in mental health support for existing clients but also showcased the possible future of healthcare delivery on the island. As the only public mental health facility in Guam, GBHWC is committed to promoting wellness and recovery through culturally sensitive care, striving to overcome challenges

	such as funding limitations, workforce shortages, and mental health stigma to meet the community's needs.
Department of Youth Affairs	The Department of Youth Affairs (DYA) in Guam is dedicated to fostering positive youth development and empowering young people in the community. Focusing on education, counseling, life skills training, and recreational activities, DYA collaborates with various agencies and organizations to create a supportive environment. Their programs are designed to assist at-risk youth and provide them with opportunities to make responsible choices and transition successfully into adulthood, recognizing and embracing the unique cultural context of Guam.
Guam Public Library System	The Guam Public Library System (GPLS) is more than just a repository of books; it's a crucial community hub providing essential internet access to the people of Guam. Not merely a library, GPLS serves students, job seekers, and others who depend on digital connectivity. When Typhoon Mawar destroyed the Office of Infrastructure Policy and Development's (OIPD) office, GPLS quickly stepped in to become the temporary home for both BEAD and Digital Equity (DE) initiatives. This act underlines the vital, multifunctional role GPLS plays in the community, highlighting the ongoing support it requires to meet its diverse public-serving missions.
Office of Homelessness Assistance and Poverty Prevention	Office of Homelessness Assistance and Poverty Prevention (OHAPP) is the lead agency for coordinating homelessness programs for the Government of Guam and works with other GovGuam agencies and the Guam homeless coalition to further efforts. It’s important to work with those who have a responsibility to the least connected islanders.

3.2.2 Community Anchor Institutions

The Broadband Challenge in Guam's Anchor Institutions

The nationwide assumption that Community Anchor Institutions, like schools, hospitals, and libraries, usually are provided with top-tier gigabit internet is a far cry from the reality in Guam. Instead of being given access to a standard high-speed network, many institutions negotiate their own internet access contracts with local commercial providers. Imagine if every school in a city had to negotiate its textbook prices individually rather than benefiting from a bulk order. This has led to two significant issues:

1. Inconsistent Speeds: The internet speed in one institution might be different from another, even if they're located just down the street from one another. This variability can create disparities in the quality of services, impacting everything from online learning in schools to digital medical records in hospitals.

2. Sky-High Costs: Some institutions report that to secure decent internet speeds, negotiations have resulted in costly deals. It's like paying a premium for regular water supply when it should be available at a standard rate.

3. Examples: When examining the state of broadband access in Guam's Community Anchor Institutions, one is presented with a picture that invites reflection and action. For example, the Guam International Airport—a vital hub for the island. Its current broadband situation, shaped by multifaceted negotiations with carriers, illustrates the challenge of securing consistent, high-speed internet at a reasonable cost. Similarly, the Guam Public Library System and the many Mayors' offices across the island face challenges securing equitable internet agreements with commercial carriers.

In Guam, our quest for comprehensive digital connectivity is marked by both progress and challenges. While our Internet Service Providers (ISPs) have made strides in enhancing our digital landscape, certain challenges persist.

Though our ISPs play a significant role in our digital journey, it's clear that more collaborative efforts are needed to address these disparities. Our goal should be ensuring that our Community Anchor Institutions, and by extension – our community, have equitable access to cost-effective broadband. As Guam looks to the future, enhancing our broadband infrastructure with a more aligned approach with our ISPs is crucial for the community's holistic development.

Defining Anchor Institutions in Guam

Introducing Community Anchor Institutions

Put simply, a Community Anchor Institution generally has a place, a team, and a mission to serve the public.

- Community Anchor Institutions derive some of their value by having a public or semi-public physical space (usually indoors, but sometimes both indoors and outdoors). A common characteristic of Community Anchor Institutions is they are frequently used for local or state "events" of various sizes. The public can gather there, at least on occasion. Many organizations have multiple locations gathered under the same administrative umbrella, and we would consider each of these locations as potentially its own Community Anchor Institution location.
- Community Anchor Institutions serve the public through the presence of staff dedicated to fulfilling the mission. For example, a public monument or square might be a physical place where people can gather, but it likely does not have a dedicated team working on a mission to help people. As a result, that public monument is less likely to truly be considered a CAI.
- Community Anchor Institutions have a public mission or reason to exist beyond the team and the physical property. This mission might be serving one limited community or constituency (a veteran's center, for instance), or might be open to the entire public (a library, for example). The mission distinguishes a Community Anchor Institution from being a pure meeting place (for example, a hotel lobby) or place of business (a mall, for instance–though some malls might have public institutions or joint missions written into their permitting).

Guam's Definition of Community Anchor Institution

The National Telecommunications and Information Agency (NTIA) laws and standards allow Guam some freedom to decide what is considered a "Community Anchor Institution." This means that things like whether a place is operational, or its size, can be used to determine whether an agency or organization is considered a Community Anchor Institution. Guam is also able to add new categories, but it has to be careful about some rules. For example, places that are solely religious or fully business-related might not be eligible for funding from certain federal programs, but it might be useful to create different categories for these types of entities in the future.

A significant missing piece from the NTIA's definition of Community Anchor Institutions include groups that work to preserve and promote indigenous cultures. This

might be missing because the Infrastructure Act focuses on tribal groups, and Guam's indigenous populations aren't organized in the same way. So, it's a good idea for Guam to ensure its rules include local groups that work with indigenous cultures and have a physical space as Community Anchor Institutions.

Guam will also refer to Village Mayor's Offices as Community Anchor Institutions as they do many things for the communities they serve.

About the Database and Process

The Guam Office of Infrastructure Policy and Development (OIPD), as part of its work in developing a Five-Year Action Plan for Broadband, is required to perform asset inventories including an assessment of "Community Anchor Institutions" (CAIs) throughout the island. The Office is currently developing a database (contained as a Google Sheet at this time) with data dimensions for each Organization and each Location relevant to the agreed upon definition. The current list of CAIs might be seen as a "Candidates" list; ideally the individual data will go through a contact-and-verification process to ensure they are indeed existing and operational entities.

One Organization is presumed to have one or more Locations in the CAIs Database model. Aspects of each Community Anchor Institution currently being collected by the Office include:

Organization Dimension:

- Name of entity
- Categorization according to perceived mission
- Management contact information
- Website location where available

Location Dimension:

- Local "Branch" Name
- Phone
- Physical address where available
- Geopositioning data
- Service data, where available, from the FCC National Broadband Map

In the future it might also be useful to gather for each Location:

- Physical space dimensions
- Building heights

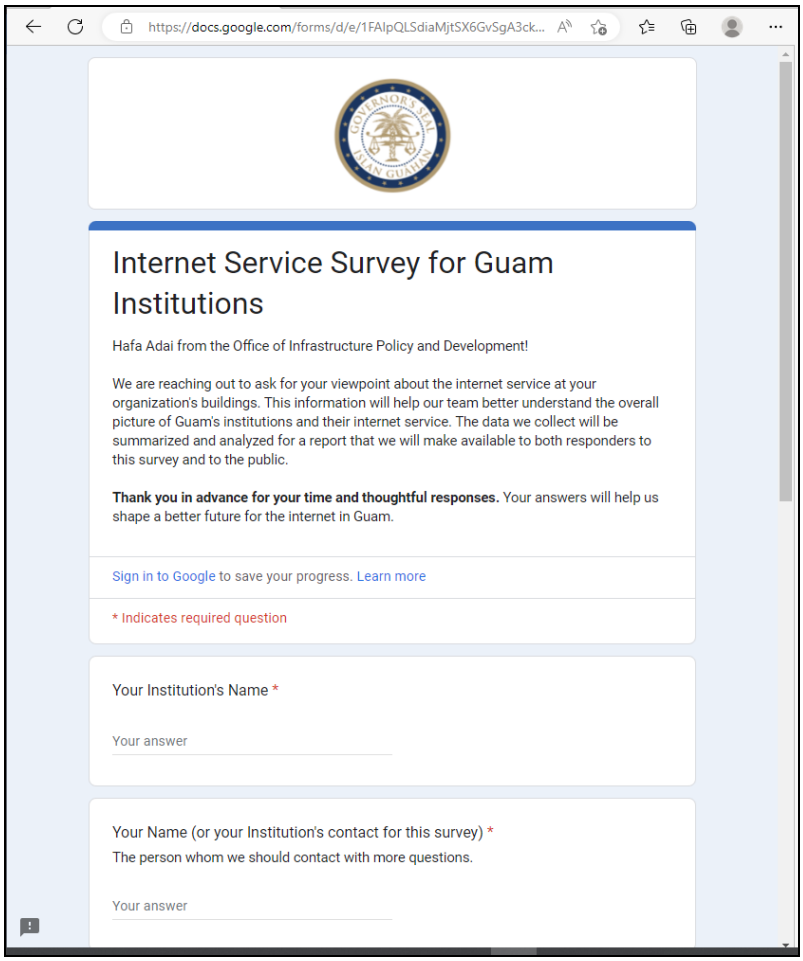
During the Verification process, the Office will coordinate with other government agencies and the Governor's Office as required, in order to settle on specific guidelines for what will and will not be considered a Community Anchor Institution. The minimal effect of these guidelines will be to confirm which entities will be eligible for funding consideration for Broadband (and possibly Digital Equity) programs.

Survey

As the list of Community Anchor institutions is established, the Office of Infrastructure Policy and Development will begin sending out surveys to determine which Community Anchor Institutions are served with Gigabit Access. Along with basic institutional information, the form will survey questions such as:

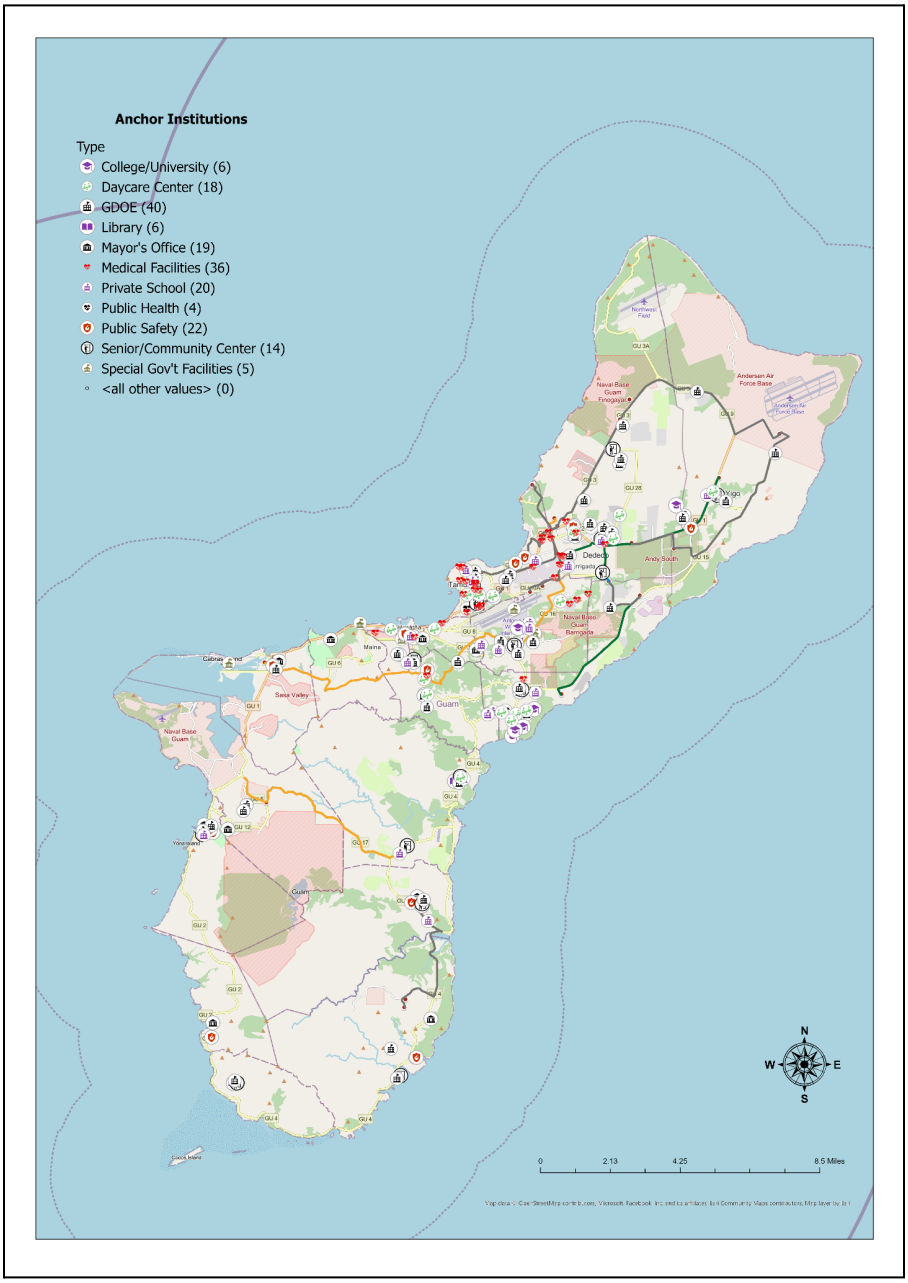
- How much internet bandwidth does your organization have at this location, total?
- What type of service (if any) does your organization have at this location?
- How much does your organization pay for internet service each month? Annually?
- Which is your internet service provider?
- Does your organization offer free public wireless internet to the public or visitors/users from the public?

The list will be adjusted as time goes on in order to adjust to feedback from the surveyed population. The survey for single-Location CAIs will be delivered as a Google form to all listed institutions and is pictured below.



Organizations with multiple Locations will be asked instead to fill out a spreadsheet template. This spreadsheet will contain the same types of data as the survey, but will also be used to confirm the geo-coordinates of individual Locations.

Finalizing the Data: Once the Office is finished developing this list of verified CAIs, map layers will be developed using GIS software. The resultant map, of which an in-progress version is below, can be published, along with publicity, to the Office of the Governor's website and to the eventual Guam Broadband Initiative website.



Examples of Community Anchor Institution Maps and Data From Around America

Many states gathered Community Anchor Institution information in the 2010s. Some examples can be seen online for Maryland, Colorado, and Oregon. Hawaii County has its map integrated fully into a website feature encouraging public exploration. The State of Michigan LEO Broadband Office advertises a new Geospatial Asset Map that will likely expand its Community Anchor Institution map coming soon, and other state broadband sites make similar claims. Some states, such as Wisconsin, have datasets online that are downloadable. Unfortunately, the concept of broadband to institutions has been around long enough that many states have dated information banks. Guam will be lucky to have this information fresh and easy to maintain.

Value of Community Anchor Institution Data beyond Broadband

Funding Opportunities: Having a full and well-maintained database of Community Anchor Institutions will make Guam agencies and institutions like the Office of Infrastructure Policy and Development more capable of planning for and responding to new funding opportunities as they come available. The database can be especially critical in identifying and developing partnership opportunities based upon constituency and geographic alignments.

Information Technology/Cybersecurity: Information Technology organizations like Guam's OTECH frequently need to engage with CAIs in order to deliver notices and advice, communicate the availability of new service classes or Information Technology resources, and advise on current cybersecurity conditions. While in some states the office of Information Technology manages its own database of CAIs, it will make sense in Guam for the list to be made public through an organization that regularly issues data communications for the public.

Public Safety: Since many CAIs have some role to play in sheltering the community and keeping residents safe, public safety officers and organizations will benefit from having a list of CAIs available to improve their work. For example, a Guam Police or Attorney General's office team seeking to engage the public in outreach about a problematic trend in public safety might turn to the CAIs database in order to get a good feel for where they might best be able to engage the public. Or, during an emergency, local and national crisis response teams might use the available database to publish public safety evacuation and shelter maps. Making these processes more efficient and thorough could have a tangible impact on real public safety.

Public Transparency: Having a clean, thoughtfully developed, and well-communicated database will serve the public through increased transparency of which organizations are or are formally considered as Community Anchor Institutions. Such a database may provoke public comment and response, which itself will be

valuable in maintaining and refining data, and increasing public confidence in government processes. To date, we have identified 190 anchor institutions throughout the island. To view the full public list, please visit:

https://docs.google.com/spreadsheets/d/1ipUAgBP9f1KiwMh2fWq6-K3b_QadZwmgrkIc-0opxjQ/edit?usp=sharing

Agat Public Library	165 Follard St.	Agat	Library		13.384756	144.659458
Barrigada Library	177 San Roque Dr.	Barrigada	Library		13.468647	144.799161
Dededo Library	283 West Santa Barbara Avenue	Dededo	Library		13.516903	144.839019
Guam Public Library	254 Martyr St.	Agana	Library		13.472761	144.753964
Merizo Library	376 Joseph A. Cruz Ave.	Merizo	Library		13.271272	144.672839
Yona Library	265 Sister Eucharita Drive	Yona	Library		13.407731	144.772919
Civil Defence/DHS	221-B Chalan Palasyo	Agana Heights	Special Gov't Facilities		13.472047	144.748792
GIAA	355 Chalan Pasaheru B224-A,	Tamuning	Special Gov't Facilities		13.485433	144.799578
Govenor's Office	Ricardo J. Bordallo Complex, 513 W	Adelup	Special Gov't Facilities		13.479128	144.729908
Guam National Guard	430 Army Dr.	Barrigada	Special Gov't Facilities		13.474633	144.808986
Port Authority	1026 Cabras Hwy.	Piti	Special Gov't Facilities		13.461094	144.670614
Agana Heights Mayors Office	363 Francisco Javier Ave.	Agana Heights	Mayor's Office	WAP1	13.465011	144.747669
Agat Mayors Office	Bldg. 393 South Rt. 2	Agat	Mayor's Office	WAP2	13.387992	144.659353
Barrigada Mayors Office	124 Luayao Ln.	Barrigada	Mayor's Office	WAP3	13.469264	144.799683
Dededo Mayors Office	Iglesia Cir.	Dededo	Mayor's Office	WAP4	13.517033	144.838997
Hagatna Mayors Office	236 Rte. 7A	Hagatna	Mayor's Office	WAP5	13.472225	144.758208
Inarajan Mayors Office	131 San Isidro St.	Inarajan	Mayor's Office	WAP6	13.300275	144.761947
Merizo Mayors Office	440 Chalan Joseph A. Cruz	Merizo	Mayor's Office	WAP7	13.271342	144.674506
Mangilao Mayors Office	105 Commissioner Way, 10	Mangilao	Mayor's Office	WAP8	13.448019	144.802097
Mongmong Toto Maite Mayor Office	Bldg. 226 Aragon Street	Mongmong Toto	Mayor's Office	WAP9	13.467083	144.782361
Ordot Chalan Pago Mayors Office	171 Dero Rd.	Ordot Chalan Pa	Mayor's Office	WAP10	13.446883	144.758967
Sinajana Mayors Office	117A Chalan Guma Yu'us	Sinajana	Mayor's Office	WAP11	13.462825	144.754472
Talofofo Mayors Office	184 N San Miguel St.	Talofofo	Mayor's Office	WAP12	13.355514	144.755772
Tamuning Tumon Mayors Office	120 Tun Jesus Crisostomo	Tamuning Tumon	Mayor's Office	WAP13	13.488161	144.783211
Umatac Mayors Office	159 Rt. 2	Umatac	Mayor's Office	WAP14	13.298528	144.663339
Yigo Mayors Office	West Gayinero Drive, 274 29	Yigo	Mayor's Office	WAP15	13.535708	144.893089
Yona Mayors Office	265 Sister Eucharita Dr.	Yona	Mayor's Office	WAP16	13.409764	144.775175
Santa Rita Mayors Office	183 A. B. Won Pat Lane	Santa Rita	Mayor's Office	WAP17	13.386036	144.670142
Piti Mayors Office	260 Assumption Drive	Piti	Mayor's Office	WAP18	13.462078	144.693322
Asan Maina Mayors Office	141 Nino Perdido St.	Asan Maina	Mayor's Office	WAP19	13.471817	144.716642
DPHSS	520 W Santa Monica Ave.	Dededo	Public Health		13.52247199	144.834431

Above: Sample of the Anchor Institution Directory.

3.3 Asset Inventory

3.3.1 Broadband Deployment Assets

To expedite and streamline the deployment of broadband infrastructure in a cost-effective and efficient way, leveraging existing publicly-owned broadband infrastructure is essential. Over the past 20 years, the Guam Power Authority has established a substantial fiber and wireless network. This infrastructure could act as the backbone for a public Middle-Mile system across the island, addressing concerns like latency, cost, reach, resiliency, and affordability.

Figure 1 provides a comprehensive map of both the current and proposed broadband infrastructures for the Guam Power Authority and the Guam Waterworks Authority. Meanwhile, Figure 2 showcases the Guam Power Authority's existing wireless coverage, covering all metered locations across Guam. Figure 3 below shows the location of existing or planned Tier 3 routers.

Fig. 1: Fiber Assets

Fig. 2 Existing Tier 2 Wireless Routers

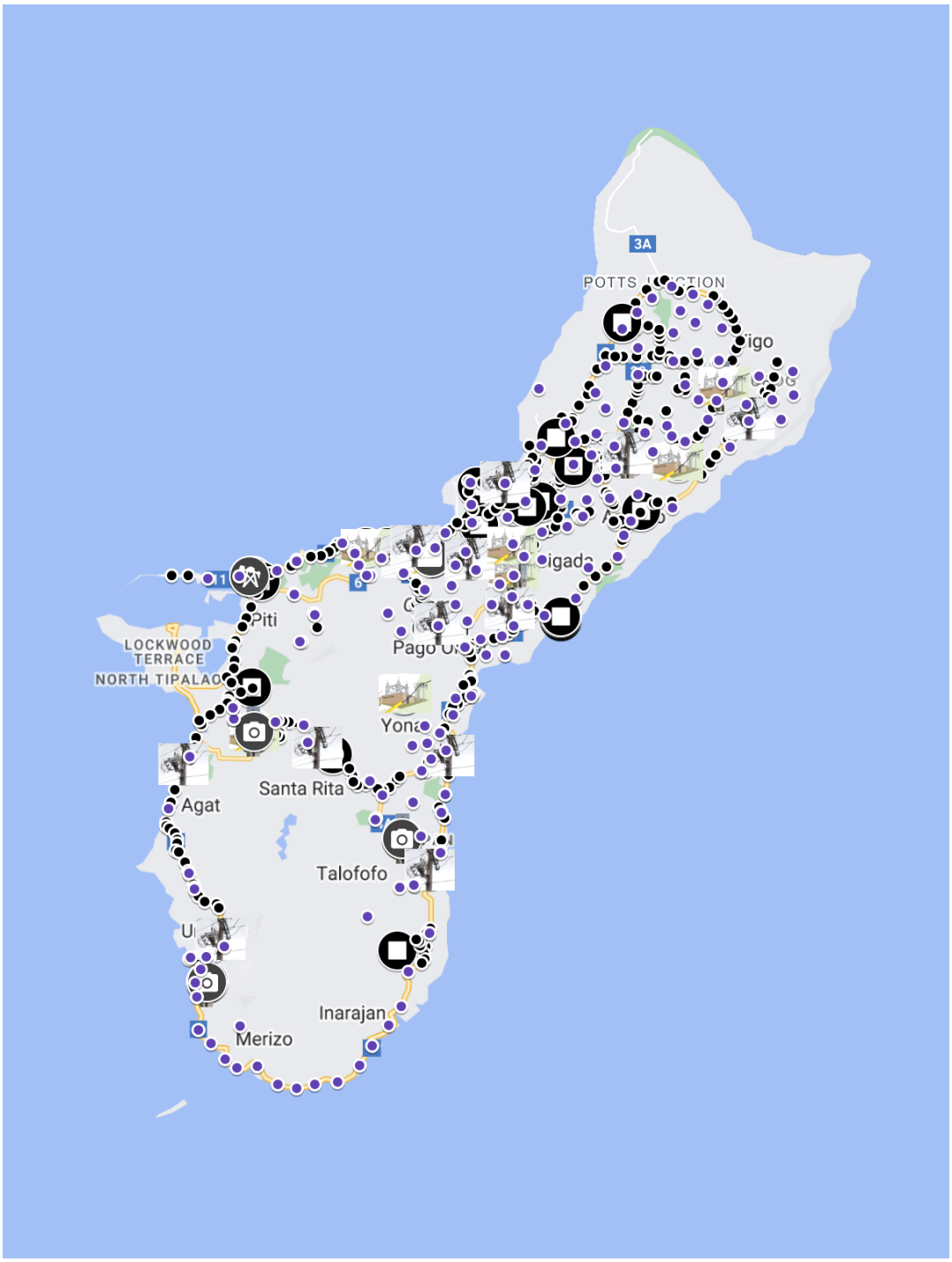
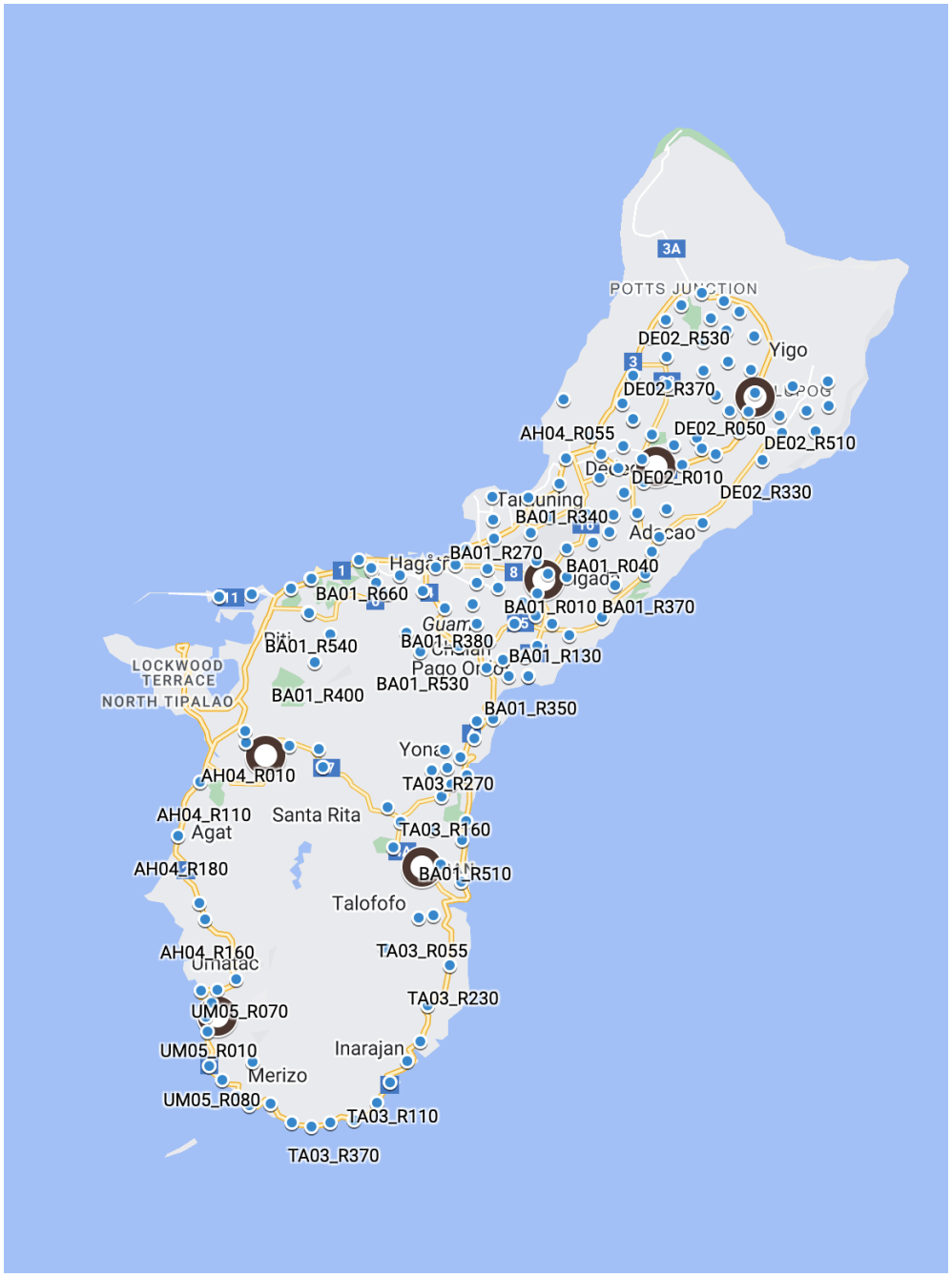


Fig. 3 Existing or planned Tier III Wireless Routers



Guam Office of Technology Fiber and Service Distribution

Dept		Village	km	miles
DPHSS	Northern Clinic	Dededo	14.7	9.134
DPHSS	Ran Care Building	Tamuning	3.7	2.299
DPHSS	Hesler Place	Hagatna	0.45	0.280
DPHSS	Terlaje Building	Hagatna	0.65	0.404
DPHSS	Castle Mall	Mangilao	9.9	6.152
DPHSS	WIC	Tiyan	6.3	3.915
DPHSS	Southern Clinic	Inarajan	37.3	23.177
GPD	Northern Precinct	Dededo	14.1	8.761
GPD	Tumon Precinct	Tumon	8.1	5.033
GPD	Central Precinct	Sinajana	2.3	1.429
GPD	Agat Precinct	Agat	17.6	10.936
GPD	GPD HQ	Tiyan	7.4	4.598
DRT	DRT HQ	Barrigada Heights	9.7	6.027
DRT	DRT HQ	Barrigada Heights	9.7	6.027
DOA, DLM	ITC Bldg	Tamuning	4.2	2.610
Gov Office	Adelup	Adelup	2.7	1.678
GSA	GSA	Piti	7.7	4.785
DOC	Department of Corrections	Chalan Pago	7	4.350
DYA	Department of Youth Affairs	Mangilao	10.4	6.462
DOAG	Agriculture	Mangilao	10	6.214
Gov Office	Guam Relief Center (BOH 3rd Fl)	Hagatna	0.65	0.404
DPR	SHPO	Agana Hts	1.3	0.808
CQA	Customs & Quarantine	Tiyan	5.9	3.666
GBHWC	Guam Behavioral Health & Wellness Center	Tamuning	5.7	3.542
DPW	DPW Campus (DPQ, GRTA, DRT)	Tamuning	7.8	4.847
OTECH	Verizon Hub	Hagatna	0.2	0.124
GHS	Office of Civil Defense (GovGuam owned)	Agana Hts	0.75	0.466
GMHA	Skilled Nursing Facility	Barrigada Heights	14.4	8.948

3.3.2 Broadband Adoption and Why

Broadband adoption lies at the heart of a community's ability to thrive in an increasingly digital world. While having the infrastructure for high-speed internet is crucial, its full potential is only realized when individuals and institutions actively incorporate digital tools into their daily lives.

Without adoption, access remains an underutilized asset, like to a library where books are rarely read. To truly bridge the digital divide, we must prioritize a comprehensive strategy that boosts adoption, supported by increased access. This strategy would combine awareness efforts, educational programs, infrastructure initiatives, and collaborative endeavors. With a keen emphasis on both adoption and access, we set the stage for a future where all members of our community are not just connected, but empowered to harness the full spectrum of digital opportunities.

1. Public Awareness Campaign: Launch a targeted public awareness campaign to educate individuals and businesses about the benefits of broadband internet and its relevance to their daily lives. This can include digital and traditional media advertisements, community events, workshops, and partnerships with local organizations.

2. Digital Literacy Programs: Develop and implement digital literacy programs that provide training and resources to individuals who may be unfamiliar with using the internet or lack the necessary skills to navigate online platforms. These programs can be conducted in partnership with community centers in the villages, schools, libraries, and other local institutions.

3. Affordable Internet Options: Work with internet service providers to develop affordable broadband packages specifically tailored to low-income households and underserved communities. This can involve negotiating discounted rates, offering subsidized plans, or exploring partnerships with government assistance programs to make internet access more affordable and accessible.

4. Infrastructure Expansion: Invest in infrastructure development to expand broadband coverage to underserved areas. This can involve building additional network infrastructure, deploying wireless connectivity solutions, or utilizing innovative technologies like satellite internet to reach remote locations. Collaborate with private sector entities and leverage public-private partnerships to expedite the expansion process.

5. Community Wireless Internet Networks: Establish and provide available basic wireless internet throughout the community. By expanding wireless internet networks available in public spaces such as parks, libraries, and community centers, and building

upon existing public wireless networks, we can provide free or low-cost internet access to residents. These networks can bridge the digital divide and ensure that individuals without home internet can still connect to essential online services and resources.

6. Digital Inclusion Programs: Implement programs that focus on bridging the digital divide by providing devices, such as laptops or tablets, to low-income individuals or families who cannot afford them. Combine device distribution with training and support to enable individuals to effectively utilize the internet for education, employment, healthcare, and other essential needs.

7. Partnerships and Collaboration: Foster partnerships and collaboration between government agencies, internet service providers, educational institutions, and community organizations. By working together, stakeholders can pool resources, share best practices, and collectively address barriers to broadband adoption, such as affordability, digital literacy, and infrastructure challenges.

By implementing these action steps, communities can foster a culture of broadband adoption, empower individuals with digital skills, and bridge the digital divide, leading to increased access and utilization of broadband services to all.

3.3.3 Addressing Affordability

Why affordability matters in Guam

Broadband affordability is a major concern in Guam, where residents face among the nation's highest internet rates. Various stakeholders pinpoint these costs as the principal barrier to widespread broadband adoption. However, the underlying reasons for such high rates remain a mystery to consumers. For many, the prohibitive cost leads to financial burdens and a growing disconnect to affordable broadband.

In the unprecedented era of worldwide internet, broadband access is more than just connectivity—it's a lifeline to education, healthcare, and civic engagement. When such essential access is prohibitively priced, it constrains opportunities across sectors. The lack of cost transparency further widens the digital divide and society as a whole suffers.

Addressing Guam's broadband challenge necessitates more than just cost adjustments. Transparent and truthful communication regarding the factors driving these costs can build trust and pave the way for a more digitally inclusive Guam.

To address the need for affordable and reliable broadband service, Guam has developed an action plan with the following key steps:

1. Clearly Define Affordable Broadband Service Categories:

a. Residential Broadband Serviceable Location: Ensure fixed broadband internet access is available for residential structures.

b. Business Broadband Serviceable Location: Extend internet access to all non-residential structures, including businesses, government entities, and non-profit organizations.

c. Price Target: Set a reasonable monthly cost for residential and business broadband service.

2. Define Standards for Residential Affordable Broadband Service:

a. High-Speed Internet Service: Provide download speeds of 100 megabits per second and upload speeds of 20 megabits per second to residential locations for at least 95% of the subscribed service duration.

b. Low Latency: Maintain round trip times to the nearest U.S. -based internet exchange point below 100 milliseconds for 95% of the subscribed service duration.

c. Reliability: Ensure uninterrupted connection availability, regardless of weather conditions, with outages not exceeding 99% of the subscribed service duration.

d. Affordable Subscription Cost: Offer a mass-market, non-discounted subscription at, or below, $75 per month.

3. Define Standards for Business Affordable Broadband Service:

a. High-Speed Internet Service: Provide download speeds of 100 megabits per second and upload speeds of 20 megabits per second to business locations for at least 95% of the subscribed service duration.

b. Latency: Less than 100ms.

c. Reliability: Ensure uninterrupted connection availability, regardless of weather conditions, with outages not exceeding 99% of the subscribed service duration.

d. Affordable Subscription Cost: We will engage in a collaborative process with businesses, potential business owners, and Internet Service Providers to determine an appropriate range of price targets. These targets will be applied uniformly, with flexibility for tailored agreements based on specific business needs, ensuring a balanced approach that serves the interests of all parties involved.

e. Universal Availability: Ensure that internet service is accessible to all businesses, organizations, institutions, and government entities.

By implementing this action plan, Guam aims to establish clear standards for affordable broadband service in both residential and business categories. This will enable residents and businesses to access fast, reliable, and affordable internet services, promoting digital inclusion and supporting economic development on the island.

3.3.4 Broadband Access

Broadband access in Guam today is marked by a stark contrast between the potential offered by new technological advancements and the ground realities faced by a significant portion of its residents.

1. Limited Fiber Optic Reach: Despite the technological advancements globally, fiber-to-the-home (FTTH) connectivity in Guam is still in its nascent stage. As of today, less than 20 locations have access to FTTH. This infrastructure offers high-speed, low-latency connectivity, but its limited reach means most of the island's residents can't benefit from it yet.

2. Reliance on Older Technologies: In the absence of widespread fiber coverage, a majority of households and businesses in Guam rely on older broadband technologies like DSL (Digital Subscriber Line) or cable. These technologies, while providing internet connectivity, are not as fast or reliable as FTTH and tend to have higher latency issues.

3. Affordability and High-Cost Plans: Even though there are multiple providers like GTA Teleguam and Docomo Pacific offering various broadband packages, the costs associated with these plans are relatively high. Such expensive plans limit digital accessibility, especially for households with limited incomes.

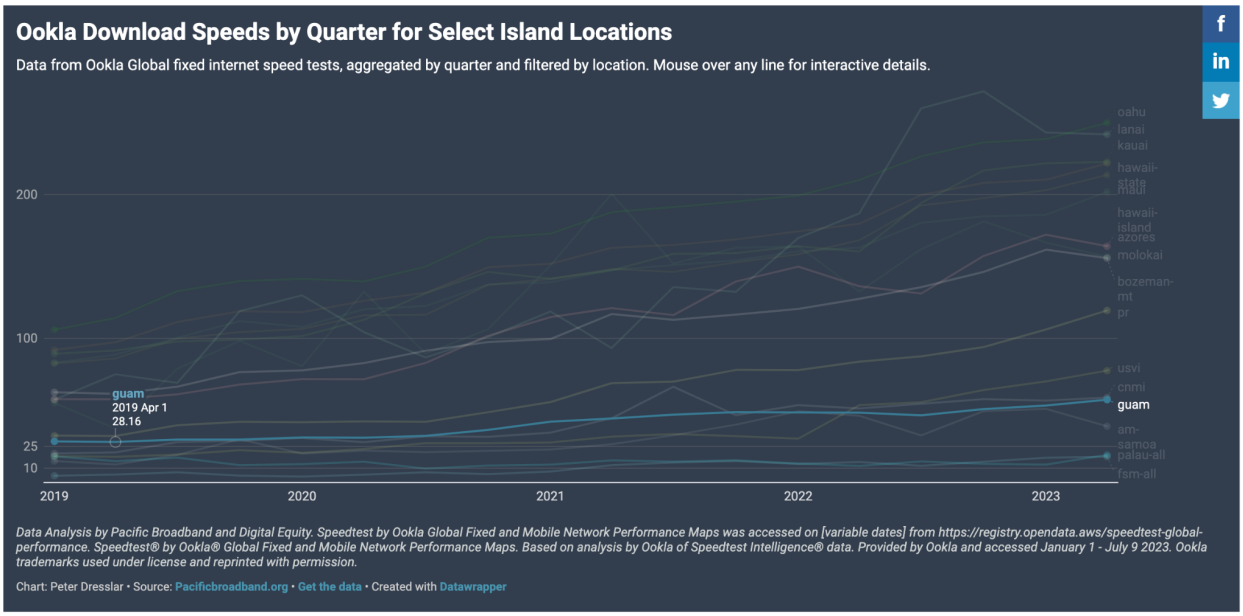
4. Universal Access Challenges: The digital divide is evident in Guam. More densely populated villages and areas might have more available, albeit older, internet technology access. In contrast, more sparsely populated villages and areas face both connectivity and affordability challenges.

6. Natural Disaster Vulnerability: Typhoons, such as Typhoon Mawar, underscore the urgency for a resilient broadband infrastructure. Such natural disasters can cause disruptions, emphasizing the need for resilient systems.

7. SEA-US Cable and the Future: Guam's inclusion in the SEA-US submarine cable system gives it a bandwidth advantage. However, effectively leveraging this system for the benefit of every resident requires more comprehensive strategies, especially in expanding Fiber To The Home (FTTH).

8: Pace of Improvement: The speeds available to Guam consumers have lagged behind increases in most of the world over the last five years. Where we are only starting to see consumer plans at high prices get closer to the served 100 Mbps standards, around the world the pace of speed is increasing daily. As seen in the chart below[3] Guam's highest speed aggregate measured by Ookla data has remained nearly flat compared to Hawaii, Puerto Rico, and small remote areas such as Bozeman Montana – which has a third of Guam's population.

[3] https://www.pacificbroadband.org/resources/#speedtest



In conclusion, while Guam holds a strategic position in global digital connectivity corridors, the on-ground infrastructure needs significant enhancement.

Addressing the challenges of latency, leveraging newer technologies like fiber, and ensuring affordability will be crucial steps forward. The goal is a digitally inclusive Guam where all residents have access to fast, reliable, and affordable internet.

3.4 Needs and Gaps Assessment

3.4.1 Latency

Paraphrasing one carrier, "Nobody else anywhere in the most remote town in the U.S. has to deal with the undersea cables."

Every corner of Guam currently faces a significant digital handicap, lacking access to broadband service that meets the standard for latency essential to support real-time, interactive applications. By the very definition provided in Title 47 USC 1702, this classifies all Broadband Serviceable Locations in Guam as unserved. The tangible repercussions of this high latency are glaringly evident when attempting to use applications that require real-time interaction based in the cloud.

High latency in Guam has a tangible impact on the daily lives of its residents. First, everyday activities that many take for granted, such as using map applications or accessing certain websites, become a test of patience.

Second, cloud-based applications, which many educational, business and recreational tools are based on, face interruptions. These real-life delays mean students may struggle with online learning platforms; professionals might find difficulty accessing and sharing large files or collaborating in real-time, and even leisure activities like streaming movies or playing online games become less enjoyable due to buffering and lag.

Furthermore, high latency affects local businesses and developers. Applications that require real-time data processing become challenging to operate, making tasks like data analysis painstakingly slow. Developers face delays in updating software, testing, and deploying new applications, hindering productivity and innovation.

Additionally, research endeavors, crucial for students, academics, and professionals, are hampered. Accessing databases, downloading papers, or browsing for information can become tedious.

Lastly, while the tech-savvy might identify latency as the issue, many might mistakenly blame their devices or the application itself, leading to unnecessary expenses in device upgrades or software changes. High latency in Guam means diminished online experiences, hindered productivity, and added frustrations in an increasingly digital world.

The effects of Latency aren't always clear to non-technical users; since Guam's download and upload speeds are usually quite poor, it is natural for users to blame application stutters and failures on poor and inconsistent bandwidth. While this is sometimes the

case, it is the observation of the Office of Infrastructure Policy and Development that high latency to the nearest application servers is just as frequently to blame for these problems.

3.4.2 Deployment Gaps

At the 30,000-foot view, the FCC National Broadband Map can sometimes paint a confusing picture of Guam as a well-connected island. But a different story emerges when one zooms in and digs deeper into the data beneath this surface-level assessment. On-the-ground realities unveil gaps in broadband deployment. While the map might suggest coverage, Internet Service Providers (ISPs) reveal that many areas still await 'to the curb' or 'to the home' infrastructure.

In simpler terms, high-speed internet could be in the vicinity, but it's not necessarily reaching every home, every business, or every classroom.

Parts of the island face challenges with the 'terrestrial middle mile'—a vital bridge that connects our central internet infrastructure with local networks, making high-speed internet accessible to residents. The surge in network development activities across various vendors isn't just routine maintenance. It's an acknowledgment of these pressing gaps and a testament to their commitment to bridging them.

However, infrastructure isn't the only concern. Questions loom about our undersea cable bandwidth: How much cable is available to serve Guam's populace? Are we tapping into its full potential or merely scratching the surface?

A note on speed test results and consumer feedback: *In the real world, many factors influence the speeds you experience. When you run a speed test at home and discover that the results fall short of what's promised, it's not just an abstract concern; it's a tangible issue that impacts your daily life. Many carriers dismiss these discrepancies, attributing them to the number of devices connected, the number of people using the web, what's streaming, or countless other everyday activities.*

We must think past accepting measuring speed under ideal or theoretical conditions, also known as marketing speeds. These numbers may look impressive on paper, but they often don't reflect the real-world experience of users. Nobody connects their phone via a CAT-6 cable, nobody's TV streaming box operates in isolation, and nobody's online experience happens in a vacuum.

What matters is how the internet performs when you live your daily life, not just in an isolated ideal setting. We plan to gather your speed test results and customer experience reports, and they are more than just data to us; they're valuable insights into how we can better serve you. We're committed to making sure that the speeds

purchased by you are the speeds you receive, no matter how many devices are connected or what your family is streaming.

Speed testing isn't just about numbers and technicalities; it's about trust, reliability, and satisfaction as a customer. When assessing today's speeds to make deployment decisions, we won't be satisfied with excuses or idealized benchmarks. We're working tirelessly to ensure that the internet you expect works the way it should in the context of your real life.

3.4.3 Affordability Gaps

While Guam's carriers are making efforts to improve connectivity, the high cost of connectivity for islanders is an urgent concern. It underscores the importance of establishing an official affordability standard. Despite their endeavors, it is both necessary and required to lay down a pricing benchmark that truly serves the broader community. Ensuring that low and middle-income families can access digital resources without burdening their finances is not just a matter of fairness—it's crucial for promoting societal growth and digital inclusion, and it begins at home.

Currently, most of Guam's broadband services don't align with the affordability criteria set out in the Bipartisan Infrastructure Law (BIL) for High-Speed internet. Such pricing hurdles affect our local businesses, especially startups, diminishing their global competitiveness. There's also a ripple effect on our pivotal tourism sector, an essential pillar of Guam's economy. Even a single negative review about inadequate or expensive internet can deter potential tourists.

In order to find solutions, we must frame the dilemma.

Residential

Guam has some of the least affordable internet access in America by any dimension. According to the Pacific Broadband and Digital Equity Affordability Tracker,[4] Guam residents pay far more for home internet services than residents in Hawaii and even residents in small-town Idaho. The following table is based on the carriers' own non-promotional marketing and listed prices as of June, 2023.

In Guam, workers earn about 33% less than the average U.S. wage[5], yet they face internet costs per Mbps that can be up to 52 times higher compared to those in the U.S.

[4] https://www.pacificbroadband.org/resources/#tracker
[5] https://www.bls.gov/regions/west/news-release/occupationalemploymentandwages_guam.htm

ISP Name	Download Mbps	Upload Mbps	Price	Per Mbps
Guam / ITE	25	5	$50.00	$2.00
Guam / ITE	75	5	$75.00	$1.00
DOCOMO Pacific Premium	60	3	$110.00	$1.83
DOCOMO Pacific Extreme	120	8	$175.00	$1.46
Guam / GTA minimum	25	1	$92.00	$3.68
Guam / GTA maximum	150	30	$172.00	$1.15
Hawaii / Oahu / Hawaiian Telcom	1000	500	$75.00	$0.08
Ziply Fiber Idaho	50	50	$20.00	$0.40

That disparity in value for the money is a significant difference. It should inspire us to strive for greater equity and fairness in internet pricing.

Especially in regions like Guam, where we are committed to changing the dynamics of expensive and slow internet.

The numbers don't lie. Our path is clear. It's time for change.

The current pricing strategy Guam experiences: Where cost per Mbps decreases the more you pay. This strategy, which provides value for those who can afford to pay for the pricier plans, is not affordable for less affluent consumers.

1. **Economic Inequality:** When individuals can't afford the more expensive internet plans, this pricing system effectively results in them paying a higher cost per Mbps than those who can afford better plans. This paradigm widens the digital divide and demonstrates a stark economic disparity, making it more challenging for these individuals to fully engage in an increasingly digital society.
2. **Barriers to Entry:** If you are looking for basic internet access, such as for email or light web browsing, you might find that even the most basic internet plans are more expensive than they would be in a simpler pricing structure. As a result, 100/20 Mbps speeds are currently only accessible to those who can afford to invest $172 per month in what the government considers to be the minimum standard for internet service.
3. **Diminished Competition:** ISPs can maintain high prices for lower-speed plans, as there is little pressure to offer more affordable options for consumers. Those who can't afford the high-speed plans may find themselves stuck with a service that offers lesser value for the money.

If High-Speed Internet Access is truly a quality-of-life issue, this disparity highlights a significant economic and digital inequality. While residents in Guam earn substantially less than their stateside counterparts, they also are burdened with disproportionately higher costs for essential digital services, which could further hinder their access to opportunities, information, and overall quality of life.

As can be seen in the table above, residents of Guam pay far more per Mbps on even the least expensive plan than the standard rate in Hawaii, which trends around $.10 per Mbps of download speed. Even with the rural Idahoan ISP cited, residents pay far less than a dollar per Mbps of download–and this is on a symmetrical plan with Fiber service.

Across multiple discussions, experts and management with every carrier on the island have been unanimous in their assessment: while affordability remains a challenge, speed doesn't.

They've acknowledged that achieving a 100/20 Mbps standard is entirely feasible and can serve as the foundational benchmark for service, given the right conditions. This consensus underscores the potential for setting higher benchmarks in our pursuit of a more digitally inclusive Guam.

For an official federal source on pricing, the **Urban Rate Survey Data & Resources**[6] 2023 data offers a snapshot of internet service plans offered by various providers across different states in the US mainland. When isolating 100 Mbps download and 20 Mbps upload internet connections, monthly charges vary between $59.99 and $70.78. At this 'Served' standard, the most affordable 100/20 Mbps plan is Oregon at $59.99 per month. The most expensive is offered in Texas at $70.78 per month.

Most plans use Fiber to the Home and DSL technology, though there are Fixed Wireless options as well. Most plans offer unlimited data. Overall, it seems like a relatively small range of prices for similar service levels, indicating moderate market competitiveness. The technology used is also generally either fiber optic or DSL.

These prices for the 'served' speed alone are unavailable in Guam, and none of the available commercial plans come close.

Unlike the above example that uses the same study by the FCC, the average cost of 100/20 'served' internet across the U.S. in the study is $65.41. Meanwhile, the average cost across *all* of the Guam Plans available in the chart above, of which only one offers 'served' speed, is $112.33. This raw average is not an apples-to-apples comparison and doesn't take into consideration carrier infrastructure and carrier costs. However, it is a

[6] https://us-fcc.box.com/v/2023URSBroadbandResults isolating data for 'Served' 100/20 speeds.

clear example of the digital divide faced by consumers in Guam who are paid lower wages, and have a higher cost of living than the U.S. average.

A pure average of the prices for local internet service available to Guam is $112.33 per month. The average cost across the country is $65 per month.[7] **This is 72% more expensive.**

No matter how you look at the prices, Guamanians pay more money for slower speeds.

A note on promotional pricing: *A common industry practice is for carriers to cite plans they currently offer, with rates far below their regular pricing, as proof of affordability. However these promotional rates or introductory pricing practices are a misleading indicator. While enticing, they are not a true metric for gauging the true long-term costs of internet service. Typically, these rates are temporary introductory offers designed to lure customers, only to see prices spike once the promotion expires. Furthermore, they often come attached with hidden fees, long-term contract obligations, and the risk of significant price hikes after the promotional period.*

If Guam were to adopt a basic affordability standard of $75 per month for residential 100/20 service, we can easily see from the table above that *no* provider offers *any* plan that approaches satisfying the standard. Thus, in reality, no residences in Guam have access to affordable served broadband today.

[7] https://www.forbes.com/home-improvement/internet/internet-cost-per-month/

Why Going Mobile-Only Isn't Good Enough

The lack of an affordable monthly home internet plan can drive households, especially those with low and middle incomes, to abandon home internet due to its unsustainable cost. Relying solely on mobile internet, while convenient for on-the-go tasks, does not compensate for the absence of stable home internet for several reasons:

- Mobile plans often come with data caps. Once these limits are reached, users may face throttled speeds, making it challenging to carry out tasks like video conferencing, streaming, or large downloads.
- Mobile connections can be inconsistent depending on the location, infrastructure, and network congestion. A dropped connection during crucial activities like online exams, job interviews, or important work tasks can have severe repercussions.
- Per gigabyte, mobile data is often more expensive than home broadband. Relying solely on mobile data for all online activities can quickly become expensive, especially when streaming or downloading large files.
- While smartphones are powerful, they don't replace the capabilities of desktops or laptops, especially for more intensive tasks like video editing, graphic design, or software development.
- Many educational platforms and resources are designed for larger screens and more stable connections. Relying solely on mobile internet can hinder a student's ability to engage fully with their learning materials, thus making it difficult to retain learning modalities.
- A home internet connection can simultaneously support multiple devices, allowing all family members to access the internet. In contrast, mobile internet is usually limited to the device it's accessed from, restricting multi-user access. Our educational roundtable discussion confirmed this.
- Relying solely on mobile devices can limit users' exposure to a range of software and platforms, inhibiting the development of a comprehensive digital skill set.
- Without a stable and affordable home internet connection, individuals and families face significant challenges in education, employment, and daily life, deepening societal inequalities above the challenges islanders already face by sheer distance and cost of living.

We've been listening closely to what carriers have been telling us, and we all agree that the best way to lower your monthly internet bill is by reducing the cost of doing broadband business here in Guam. It's pretty straightforward—if carriers can save on costs, they can pass those savings on to you.

That's why we're not just sitting back. We're rolling up our sleeves and diligently pursuing ways to make things more affordable for everyone. Whether it's seeking waivers for Build America, Buy America (BABA) and the Jones Act, looking for ways to streamline the permitting process, building open-access infrastructure, or finding creative solutions like publicly-owned middle mile and a data center, we're committed to doing what it takes to bring costs down.

However, we're not content to wait.

We're committed to lowering costs as soon as possible, with affordability for Guamanians being our most immediate concern. This isn't about abstract numbers on a balance sheet; it's about putting more money back in your pocket. It's about making sure that competition thrives, so you get the best service at the best price. Together, we're working to make the internet not only faster and more reliable but also more affordable for everyone in Guam.

Business

During our community outreach efforts, we've uncovered varied pricing strategies presented by Guam's carriers. These discrepancies in pricing may arise from factors such as: the inherent challenges of deploying and maintaining infrastructure, the need to recover significant initial investments, unique service agreements, or the differing demands of businesses and consumers.

Many anchor institutions, including libraries, health centers, and other public entities, have relayed that they often find themselves priced and negotiated similarly to businesses. This perspective could impose financial strains on these institutions, which would be different if they were approached from a community-serving standpoint.

Interactions with stakeholders reveal that some businesses face substantial internet service charges while others experience differing pricing models. This can especially impact startups, hampering their competitive edge on the global economic stage. A continuous dialogue with local businesses, primarily through the Guam Chamber of Commerce, is underway to gain deeper insights into their broadband concerns and needs.

The potential impact of broadband quality and pricing on Guam's vital tourism and business industry is of paramount concern. A single negative review related to unsatisfactory internet experiences can resonate strongly with prospective tourists and international businesses. Such reviews can have a ripple effect, deterring potential visitors thus negatively affecting the broader economy. In an era where online presence and digital experiences play a significant role in travel decisions, the gravity of these reviews is even more pronounced.

Given the above, establishing an affordability standard that genuinely reflects the best interests of the entire community — encompassing the tourism industry, businesses and anchor institutions — remains a central goal.

3.4.4 Unserved and Underserved Gaps

Due to high latency, by the definitions set forth in the Bipartisan Infrastructure Law (BIL), all of Guam is considered unserved. As latency is the driving factor of the high number of unserved, it must be addressed in the most assertive of efforts.

The FCC Broadband Maps[7] suggest that roughly 25 percent of Guam is considered "Underserved." These areas lack any widely available internet service that offers advertised speeds of at least 100 Mbps for downloads and 20Mbps for uploads, which are the acceptable standard speeds. Additionally, none of these locations meet the required latency standard, which means they can be more accurately classified as "unserved."

However, determining the exact number of locations that do not meet the FCC's established standards for upload and download speeds is challenging due to issues with the current maps and a lack of clarity to Internet Service Providers regarding data reporting rules. Nevertheless, we estimate that there may be as many as 14,000 or more locations in Guam that have not been properly counted, are inaccurately represented, or are simply mislabeled on the current FCC maps.

To address these issues, the Office of Infrastructure Policy and Development is continuously evaluating this data and all other statistics derived from FCC information. OIPD is actively investing in improving mapping efforts, which will enable more precise targeting of resources within their program.

3.4.5 Community Anchor Institution Gaps

The project team is evaluating the number of Community Anchor Institutions in Guam that:

- Exist but are not mapped on the National Broadband Map
- Are mapped on the National Broadband Map as Unserved (gigabit access)
- Are mapped on the National Broadband Map as Served (gigabit access), but do not have such access
- Are mapped on the National Broadband Map as Served (gigabit access), but do not have an affordable available service
- Are mapped on the National Broadband Map as Served (gigabit access), and are today affordably and reliably served with gigabit access

The first four categorizations are gaps, although it remains to be determined whether BEAD can be used to address any or each of these gaps. Future applications of Digital Equity programming might also be appropriate for addressing these gaps.

3.4.6 Access Gaps

Many residents of Guam do not have access to a computing device from which they could constructively use the internet. Challenging living conditions can be especially punitive to certain families, who may not have quiet, private, safe, air-conditioned, and powered conditions during the day or night in which they could productively engage in digital commerce, digital communication and digital citizenship. Similar gaps in access to safe, effective workspaces appear throughout the Pacific islands, including Hawaii.

3.4.7 Digital Equity Gaps

As of this writing, precise gaps in Guam's digital equity have not yet been enumerated. However, they are currently being assembled through our ongoing outreach to the public. There are measurable gaps in digital equity. We mention affordability above, but

there will likely be observable gaps in digital inclusion, device availability, digital literacy, and digital cultural inclusion, including poor online accessibility through indigenous languages. The project team also is finding poor working conditions in which digital access might suffer from a lack of quiet, secure, and powered spaces available for residents to work in.

Gaps in digital access in Guam are particularly complex, reflecting the island's unique and diverse population. While Guam itself may be considered rural, its community is extremely diverse, encompassing groups that would be considered minorities in the United States. This includes a large indigenous population, Chamorros, and others who represent various Asian and Pacific Islander backgrounds. These broad categories often fail to capture the rich cultural diversity within Guam, where distinctions between different Pacific Islander or Asian groups can be significant. Low-income families, rural residents,veterans, elderly individuals, persons with disabilities, school-aged children, small businesses, healthcare facilities, and other marginalized groups all can experience digital access gaps. The multifaceted nature of Guam's population calls for a nuanced understanding and targeted strategies to ensure equal digital access for all. Recognizing and respecting the diverse nature of the community is essential in forming an effective approach to bridging these digital divides.

3.4.7 Information Gaps

There are real gaps in what information is shared to the Guam Office of Infrastructure Policy and Development, especially with respect to undersea fiber optic cable operators and from the Internet Service Providers. Beyond being denied access to any useful understanding of deployed middle mile and last mile infrastructure, Internet Service Providers are also not comfortable discussing internet service plan terms and conditions.

Guam ISPs will not discuss take rates or related information regarding service provision. As a result, the Office of Infrastructure Policy and Development is not currently equipped to enumerate Broadband Deployment Gaps, Broadband Access Gaps, or Broadband Adoption Gaps beyond what is already communicated in the section above.

The lack of an operational and complete National Broadband Map from which the team could draw actual working knowledge is also a material Information Gap.

The Office of Infrastructure Policy and Development is exploring mechanisms through which providers wishing to participate in BEAD programs might be asked to communicate some details of their infrastructure. This is the case despite our understanding that compelling providers to provide information may not be possible at this moment, but may be possible as conditions for participation in the use of BEAD funds are clarified.

4. Obstacles and Barriers

During discussions with various community stakeholders, affordability emerges as the primary barrier to successful internet deployment in their communities. Guam, as mentioned earlier, has some of the most expensive internet access in the United States across multiple metrics. Consumers face burdensome financial hurdles when accessing unserved speeds, and the costs for served speeds are prohibitively high.

Affordability: The foremost challenge is cost. Despite Guam's internet being among the priciest in the U.S., a perception persists that high-speed internet is a luxury. Feedback from the Mayors Council of Guam highlights areas lacking consistent high-speed services in all villages.

Perception Challenges: The prevailing high costs have inadvertently framed high-speed internet as "nice-to-have" rather than essential. ISP marketing further accentuates this perception.

Carrier Competition and Lack of Transparency: A considerable challenge is the carriers' discretion regarding their infrastructure details and ongoing projects and pricing structures, amongst other things.

Compounding Federal Ambiguity: Along with the federal government's reluctance to share data from grants, this discretion makes proactive planning challenging. A comprehensive understanding of existing infrastructure is crucial to informed decision-making.

Navigating the path to comprehensive broadband access in Guam has its complexities, and a clearer view of the carrier landscape would undoubtedly help. Other obstacles are enumerated below:

1. **Geography:** Guam's unique topographical challenges.
2. **Technological Advancements:** The need to keep pace with ever-evolving tech.
3. **Stakeholder Cohesion:** Aligning varied interests for a unified outcome.
4. **Resources:** Matching the task with the right expertise and tools.
5. **Procedures:** Navigating through federal grant procedures and timelines.
6. **Digital Literacy:** Promoting understanding of the digital landscape.
7. **Health Myths:** Addressing concerns about 4G/5G towers in a constructive manner.
8. **Remoteness:** Guam's distance from the continental U.S. affects all aspects of deployment, including cost, speed, and availability.

Greater collaboration with carriers, emphasizing transparency and shared goals, can significantly enhance Guam's digital journey for everyone.

5. Implementation Plan

5.1. Stakeholder Engagement Process

The overall stakeholder engagement process can be broken down into three phases:

1. **Initial Data Gathering**
2. **Action Plan Consensus Building**
3. **Ongoing Communications over the Entire Course of BEAD**

In the first phase, we actively gathered data to initiate the stakeholder engagement process. We pinpointed key stakeholders and collected insights about the current state of digital equity and broadband access in Guam's underserved communities. Our team reached out to leaders at community anchor institutions, organizations serving covered populations, and members of these populations passionate about promoting digital equity.

Following this, we facilitated workgroup discussions to introduce the BEAD program and sought their invaluable feedback and participation. Our outreach methods spanned media, public speaking, emails, and social media platforms. After identifying our stakeholders, we delved deeper into understanding the nuances of digital equity, broadband access, and the impact of the digital divide on underserved communities. This involved collaborative sessions with various community institutions, non-profits, ISPs, and community members, supplemented by surveys directed at community anchor institutions.

In the second phase, we channeled our energies into building consensus for an action plan that serves the public interest. We envisioned a plan that was comprehensive, impactful, and most importantly, reflective of the nuanced needs of underserved communities. Collaborative dialogue was central to this phase: we partnered with stakeholders, refining the action plan based on their feedback and ensuring it catered to the requirements of underserved areas. Moreover, we actively incorporated suggestions for projects based on stakeholder input, ensuring their voices directly influenced our strategies. We organized focus group meetings and feedback sessions to further this objective. During this period, we set clear priorities and actionable strategies to meet the BEAD program's objectives, which encompassed outlining specific goals, identifying stakeholders for implementation, and devising metrics to gauge the program's success.

Open communication was the lifeblood of this phase. We actively engaged stakeholders, keeping them in the loop through regular meetings, community sessions, newsletters, and timely updates on social media.

Transitioning to the final phase, labeled "ongoing communications," we aimed to maintain a continuous, productive dialogue with our stakeholders. As the BEAD program team moves forward with the action plan, we will be in lockstep with our stakeholders. This involves monitoring progress, assessing the program's on-ground effectiveness, and recalibrating our strategies rooted in real-time feedback and data. We pledge to remain agile, always open to identifying emerging needs and priorities, achieved through an ongoing series of surveys, focus groups, and stakeholder interviews. Additionally, this phase promises a celebration of collective milestones and accomplishments, fostering a spirit of communal achievement. We will host celebratory events, share uplifting success stories, and shine a spotlight on those pivotal to the program's journey and success.

Each phase, while having a distinct character, champions tailored engagement activities, as outlined for the diverse populations we'll be detailing below:

5.1.1 Covered Households

Since there will be so many covered households distributed somewhat evenly throughout Guam, identifying and mapping our key stakeholders will involve a significant emphasis on collaborating with individual mayor's offices and the Mayors Council of Guam (MCOG). As local authorities and representatives of their communities, they are instrumental in connecting with marginalized and underrepresented households. Their involvement will provide legitimacy and local context to the project. We have and will continue to establish a clear communication line with each mayor’s office and the Mayors Council, briefing them about the project objectives, the targeted households, and seeking their support and involvement. They will play a critical role in organizing community forums, town hall meetings, and door-to-door information drives in their respective village.

In the Proposal Phase, the MCOG and the offices will serve as primary channels for our communication strategy. They will help disseminate information about the project and its benefits to their communities, particularly the covered households. Given their direct interaction with residents, they will be instrumental in communicating how reliable internet access can impact education, telework, and access to health services. The mayor's offices will utilize local radio stations, community bulletin boards, and direct interactions with village residents during community events for this purpose. In the same way, other stakeholders such as internet service providers and non-profit organizations will be engaged, sharing project progress reports and discussing societal and economic benefits.

The Implementation Phase will involve close collaboration with the mayor's offices and the Mayors Council of Guam to encourage and facilitate stakeholder feedback. They will collect and relay the concerns, questions, and suggestions from their communities

through village meetings, digital platforms, and communication loops. The project team will work hand in hand with these offices to address the feedback, making necessary adjustments in the project planning and execution. An ongoing evaluation of the engagement plan will be undertaken with the assistance of the mayors' offices to ensure its effectiveness. Their involvement will foster community-driven, transparent, and inclusive project implementation, enhancing the project's success and sustainability.

5.1.2 Aging Individuals

During the initial identification phase, we will continue to focus on the unique needs of aging individuals in Guam, working closely with Guam's State Office on Aging (GSOA) and the Division of Senior Citizens (DSC), Department of Public Health and Social Services. These entities, along with healthcare providers, senior community centers, and family caregivers, will be identified as crucial stakeholders due to their direct connections and understanding of the aging demographic. Our collaboration with the GSOA and DSC, given their expertise and resources, will be invaluable in pinpointing the specific challenges that aging individuals face in accessing broadband services. We will organize town hall meetings, forums, and visits to senior community centers in partnership with these entities, ensuring that the voices and concerns of aging individuals are incorporated into the project.

In the Proposal Phase, we will establish a communication strategy tailored specifically for aging individuals. This strategy will articulate the benefits of broadband access, such as improved access to telemedicine, maintaining social connections, and using essential online services. We will rely on the GSOA and DSC to help disseminate this information using the most accessible and effective channels for the aging population. These channels may include local radio broadcasts, print newsletters, and community events.

During the Implementation Phase, the project team will collaborate with the GSOA and DSC to facilitate and encourage feedback from the aging population. Regular meetings and feedback loops with officials in senior community centers will serve as avenues for gathering suggestions and concerns. This feedback will then guide ongoing improvements to the project, ensuring that it effectively caters to the specific needs of aging individuals and promotes digital inclusion.

5.1.3 Incarcerated Populations

During the initial identification phase, we will address the unique needs of incarcerated individuals with a focus on promoting digital equity. We'll work closely with the Guam Department of Corrections (DOC), the Guam Coalition Against Sexual Assault & Family Violence (GCASAFV), the Judiciary of Guam, Regional advocacy organizations, and the Family Health Information Resource Center (FHIRC). As crucial stakeholders, these entities provide invaluable insights into the challenges incarcerated individuals face

regarding online access. Specific needs might encompass access to educational materials, legal resources, communication with family members, and mental health services online. We will collaborate with these organizations to gather insights through meetings, forums, and interviews, ensuring that the project is shaped by the needs of the incarcerated population.

In the Proposal Phase, a communication strategy emphasizing digital equity will be developed. This strategy will highlight the transformative potential of broadband access for incarcerated individuals. Online access can enhance educational opportunities, facilitate legal research, strengthen family connections, and provide mental health resources. The team will work closely with the identified institutions in disseminating this information to incarcerated individuals and their advocates. The information dissemination process will likely involve presentations within correctional facilities and collaboration with relevant organizations to leverage their communication channels.

During the Implementation Phase, the project team will work closely with these key stakeholders to gather and incorporate feedback from the incarcerated population. Multiple methods will be used to ensure their voices are heard and their concerns addressed, including feedback forms within correctional facilities and ongoing dialogues with advocacy organizations. This feedback will be used to continuously refine and adjust the project to ensure it effectively promotes digital equity among incarcerated individuals in Guam, fostering an environment conducive to rehabilitation and personal growth.

Department of Youth Affairs

The Department of Youth Affairs operates the only **youth correctional facility on the island**; we see how disparate treatment impacts youth and their families for generations. Most of the youth who intersect with the juvenile justice system do not have the benefit of state of the art, technological devices let alone, internet access or connectivity in their homes of origin. Bridging this gap would help 'level the playing field' and transform and improve their chances of successful outcomes.

5.1.4 Veterans

During the initial identification phase, we will closely collaborate with institutions like the Guam Vet Center, American Legion Guam, Veterans of Foreign Wars (VFW) Guam, Guam War Survivors Association, and WestCare. These entities will be identified as critical stakeholders due to their direct connections and deep understanding of veterans' unique needs and challenges. Specific digital equity needs for veterans might include access to online mental health resources, telemedicine services, employment opportunities, and digital literacy training. By leveraging the reach and insights of these

institutions, we can identify the most impactful ways to improve online access and digital equity for veterans.

In the Proposal Phase, we will craft a communication strategy emphasizing the importance of digital equity for veterans. This strategy will highlight how broadband access can significantly enhance veterans' quality of life, from online job searching and application processes, accessing educational opportunities and benefits, to utilizing telemedicine for healthcare needs. The team will work closely with the identified institutions in disseminating this information to veterans. This could involve presentations and information sessions within these organizations, and the utilization of their communication channels to reach as many veterans as possible.

During the Implementation Phase, the project team works in close coordination with these key stakeholders to gather feedback from veterans. Through mechanisms such as feedback forms, community meetings, and direct communication channels within these organizations, we can gather insights to continuously improve the project. This feedback will guide adjustments to the project, ensuring it effectively addresses the specific needs of veterans in Guam and promotes digital equity. By providing veterans with reliable online access, we can facilitate their reintegration into civilian life and help them leverage the digital resources they need to thrive.

5.1.5 Individuals with Disabilities

In the initial phase of the Broadband Equity Access and Deployment project in Guam, we will engage with critical stakeholders - the Guam Department of Integrated Services for Individuals with Disabilities (DISID) and the Guam Legal Services Corporation – Disability Law Center (GLSC-DLC). These institutions are fundamental in advocating for the rights and services for individuals with disabilities. Together, we will explore the unique digital needs of this community, which might include considerations for assistive technologies, enhanced accessibility in online platforms, and custom digital literacy programs.

During the Proposal Phase, we will collaboratively develop a robust communication strategy that underscores the essential role of digital equity for individuals with disabilities. This strategy will highlight the transformational impact of broadband access in diverse areas such as telemedicine, online education, social connectivity, and employment. The identified institutions will be vital partners in ensuring our messaging is effectively conveyed and understood by the community. We will prioritize accessible formats and universal design principles in our communication materials.

In the Implementation Phase, we will sustain our collaboration with the identified institutions, leveraging their expertise to gather and interpret feedback from the disabled community. Our feedback mechanisms will prioritize accessibility, employing

methods such as virtual consultations and feedback forms designed for easy comprehension. The insights obtained will steer ongoing refinement of the project, ensuring it remains beneficial and relevant for individuals with disabilities. Our end goal is to create a more inclusive and equitable digital environment in Guam, serving the needs of all its residents.

5.1.6 Individuals with a Language Barrier

During the initial identification phase, the Broadband Equity Access and Deployment project team will liaise with the Guam Department of Education (DOE), the University of Guam, and the Guam Community College. Collaboration with the Office of the Attorney General will also be key to ensure that project activities align with their Language Access Plan. These institutions are crucial to address language barriers experienced by Guam's diverse population, including the native CHamoru community, immigrants from the Philippines, other Micronesian regions, and beyond.

In the Proposal Phase, a communication strategy will be developed that emphasizes digital opportunity for individuals with language barriers. This strategy will highlight how broadband access can facilitate online education, job opportunities, telemedicine services, and social engagement. In order to communicate with individuals and groups with low written literacy, the project team will collaborate with local media outlets to ramp up verbal communications in commonly spoken languages in Guam, focusing on radio broadcasts, social media campaigns, and community outreach events.

During the Implementation Phase, feedback from the community will be pivotal. The project team will solicit feedback in multiple languages, ensuring a wide range of perspectives are taken into account. This may involve community meetings with translation services, bilingual feedback forms, and virtual town halls held in appropriate languages. The insights gained from this feedback will inform the ongoing refinement of the project, guaranteeing that it effectively meets the unique digital equity needs of Guam's linguistically diverse population. Ultimately, the project aims to provide inclusive online access, bridging the digital divide and creating a digital landscape that serves all residents of Guam.

5.1.7 Racial or Ethnic Minority Groups

Guam is home to one of America’s most diverse populations. In order to achieve digital equity for these groups, it is crucial to work closely with various community organizations that represent different racial and ethnic groups. The following list details examples of potential digital equity initiatives for a selection of these organizations (Guam has many more beyond this list), focusing on harnessing the potential of digital tools and broadband access to further each group's specific mission and needs. Please

note that these examples are hypothetical only, and are intended to communicate the direction in which the program intends to deliver services.

1. Guam Filipino Organizations: Promoting digital literacy among Filipino entrepreneurs and developing an online platform for Filipino-owned businesses to boost their visibility and access to the broader Guam market.
2. Guam Chuukese Community: Implementing a digital education program focused on enhancing the employability of the Chuukese community, including language software for English learners and digital job placement assistance.
3. Developing a virtual wellness hub tailored to Micronesian women, offering resources such as online health education and counseling services, and forums to encourage peer support and connection.
4. Guam Community College: Initiating a mentorship program leveraging video conferencing tools to connect All Study Abroad (API) internship students with successful alumni and professionals within their fields of study.
5. Guam Council on the Arts and Humanities: Establishing an online platform showcasing art from minority and underserved communities, alongside tutorials and workshops in digital arts, enabling wider reach for artists and fostering new digital skills.
6. Guam Women's Organizations: Leveraging digital platforms to deliver leadership and economic empowerment programs, facilitating access to online resources and support networks for women from diverse backgrounds.
7. Implementing an online cultural exchange program that encourages interaction and understanding among different cultures on Guam, using multimedia resources and interactive platforms.
8. Establishing a digital resource center providing educational and employment services for the Micronesian community, including online courses and job boards specifically curated for their needs.
9. Developing a digital marketplace for Chamorro businesses, encouraging economic development within the community and enhancing the digital literacy of Chamorro entrepreneurs geared towards the preservation of Guam’s unique Chamorro language and culture

As can be seen, each of these potential projects represents a unique opportunity to promote digital equity within Guam's diverse racial and ethnic communities. By collaborating with these representative organizations and groups and tailoring initiatives to meet the specific needs of each, the team will play a pivotal role in ensuring every individual in Guam has the opportunity to reap the benefits of global digital societies and economies.

5.1.8 Rural Individuals

All residents, businesses, and institutions of Guam are considered rural by the United States Department of Agriculture. While this means that there will not be a particular focus on rural individuals with respect to data gathering activities and general stakeholder engagement, it also presents an opportunity for the Guam Office of Infrastructure Policy and Development Broadband Team to communicate with all entities about specific broadband and digital equity opportunities available–from USDA and other federal partners–due to that rural characterization. During initial data gathering activities, the project team can enter discussions, aware of which opportunities might be available for the stakeholders being engaged. During consensus building, those opportunities should be written into the Five-Year Action Plan and emphasized to reviewing partners. Finally, during ongoing communications, the team will continue to communicate new opportunities for rural entities and individuals to the public as part of its overall dissemination of information.

5.2. *Priorities*

Table 6: Priorities for Broadband Deployment and Digital Inclusion

Priority	Description
Name of Priority	*Brief description of the priority*
Broadband Affordability	Affordable internet service for all Guam residents
Broadband Reliability	Efforts to harden broadband infrastructure for future natural disasters
Chamorro Culture Digital Access and Preservation	Preservation, promulgation, and adoption of Chamorro culture through digital access to language, resources, and individuals
Digital Literacy and Inclusion Programs for Covered Households	Digital literacy, equipment, and digital work/education/health access for Guam's numerous Covered Households

5.2.1 Tackling Latency - Bringing the Internet to Guam

To address latency, affordability and access, our Five-Year Action Plan calls for three foundational projects, beginning with the construction of a Data Center. Consensus amongst island networking experts is that some form of this idea, while difficult, is one of the few solutions to latency. The Bipartisan Infrastructure Law, having established a latency standard based on real time engagement with applications accessed by Americans, necessitates the inclusion of measures to address latency.

Achieving a lightning-fast sub-100ms round-trip time (RTT) between Guam and the mainland U.S. remains a tall order. The expansive distance, combined with the inherent speed limits of light traveling through fiber-optic cables, presents an undeniable hurdle. Yet, with the strategic implementation of Content Delivery Networks (CDNs), this challenge can be tackled head-on, creating an environment where latency feels virtually non-existent.

Dive into the heart of internet consumption. What are the people of Guam accessing? From the captivating world of streaming – think films, series, and music – to the everyday essentials like news, shopping, and software updates, the digital appetite is

diverse. If most users are flocking to a handful of global giants like Netflix, YouTube, or Amazon, then prioritizing CDNs for these behemoths could cater to a vast majority of the user demand.

Content isn't just about quantity, it's about nature. Static content, like images or scripts, remains unchanged for long spells, making them perfect for extended caching. But the dynamic content, like live broadcasts or personalized portals, are important as well.

Beyond the global powerhouses, we must address local resources. Services or platforms tailored to Guam and its neighboring islands could carve out their own substantial user base thus warranting dedicated CDNs.

It's not just about diversity,it's about volume. Anticipating the sheer scale of data traffic, alongside the potential spikes during peak times, will be instrumental in determining the capacity and number of CDNs.

Reliability is key. By incorporating redundancy through backup nodes or even diversifying across multiple CDN providers, we ensure that the digital needs of Guam are met round the clock, without interruption of service.

Lastly, the digital realm is ever-evolving. Regularly updating cached content is essential to ensure users get the latest and the best. The frequency of these refreshes will have a bearing on our CDN strategy.

By initiating our journey with CDNs for the most popular global services, we lay a robust foundation. As we journey forward, this infrastructure can be dynamically calibrated, ensuring that Guam enjoys an internet experience that's as close to real-time as possible.

Why build a Data Center?

1. Local Content Caching: A primary function of data centers is content caching. With a data center based in Guam, frequently accessed data, be it from web services or multimedia content, can be stored closer to end-users. This significantly reduces the time taken to fetch this data, enhancing user experience by reducing latency.

2. Reduced Hop Counts: Data often traverses multiple networks, routers, and switches as it moves from source to destination. Each of these transitions is termed a "hop". By hosting data locally, the number of hops can be substantially reduced, resulting in faster data retrieval.

3. Strategic Interconnection Points: Guam's geographical position makes it a potential hub for connecting various regional networks. A data center in Guam can provide optimized routing, ensuring that data takes the most direct and efficient path, further reducing latency.

4. Enhanced Redundancy and Reliability: Local data centers offer redundancy, meaning there's a backup system in place to ensure continuous service. In the event of connection failures from international sources, having a local backup can maintain service continuity, ensuring that latency is kept to a minimum, even during disruptions.

5. Optimized Local Services: For businesses and services operating within Guam, hosting their applications and services in a local data center would mean that their data doesn't have to traverse international networks. This local optimization ensures rapid data access for local users.

6. Economic and Infrastructure Development: A local data center can act as a catalyst for technological growth in Guam. This growth can lead to further infrastructural developments designed to optimize data transfer and reduce latency.

Our Plan

We will establish a Tier 4 Data Center that would incorporate the IXP, CDNs, Hosting Services, and other technologies to address latency, which would connect to both Submarine Cable Landing Station Facilities as well as islandwide Terrestrial Fiber Optic/Backhaul and Cable Station Inter-Connection Network. To support the sustainability of data center operations, coordination with other IT development initiatives, including a High-Tech industrial campus, should be actively explored.

Proposals for a data center should incorporate the following features:

Facilities & Services:

1. Submarine Cable Landing Station Facilities.
2. Tier 4 Data Center and Disaster Recovery Facilities.
3. Carrier Co-location and Network Interchange Facility.
4. Islandwide Terrestrial Fiber Optic/Backhaul Network.
5. High Tech Office Park Spaces - single owner and condominium.
6. Large Scale Solar Power and Sea Water Air Conditioning Infrastructure.

Project Location:
The ideal location would have high elevation and proximity to the ocean, public rights of way, and multiple power grid access points. The site should have sufficient land area to support large scale solar and tech park campus development, and be near the islandwide terrestrial optic cable network.

Data Center:
The center should have Tier 4 modular design, typhoon and earthquake-proof construction, multi-layer security, and integrated grid and auxiliary power sources. Tier 4, as certified by the Uptime Institute, is the highest level of data center, demanding multiple active power and cooling distribution paths. The costs can exceed $2,500 per square foot. For a medium-sized data center, using an average of 25,000 square feet as an example, the base construction cost could be upwards of $62.5 million.

Campus:
Security should include gated controlled access and campus-wide video surveillance. The campus should be outfitted with large-scale rooftop solar power, sea water air conditioning, full auxiliary power, and disaster recovery facilities.

Interconnection:

The interconnection infrastructure should be typhoon-proof and buried, featuring diverse connections to all submarine cable stations with managed capacity and extensive on-net connections to government offices and commercial buildings.

Publicly-Owned land:
Utilizing publicly owned land for a data center presents a host of advantages. Firstly, it often comes at a more favorable acquisition or lease cost compared to private land. This is particularly significant for expansive projects like data centers. Additionally, municipalities can streamline zoning and permitting processes, expediting project timelines and reducing bureaucratic delays. The establishment of a data center can also stimulate local economic development, making public entities more inclined to support infrastructure development surrounding the data center, such as roads and utilities, which in turn could open up the potential of business related growth in the area

Publicly owned land provides stability, mitigating risks associated with private landowners' financial challenges or unexpected sales. Public-private partnerships on such land can be mutually beneficial, offering potential tax incentives or technological benefits. Public entities can ensure environmental goals are met, leading to more sustainable data center operations. Lastly, with a long-term regional development vision, public entities can offer consistent support, ensuring the data center's sustained presence and operation.

Power and Electricity:
The project should include a sufficient land area for a 5MW to 10MW solar farm, optimized building rooftops for solar panel density, and an estimated 80% saving on power costs.

Attracting CDNs and Content Providers to "Bring the Internet" to Guam
Guam's unique geographic position, bridging Asia and North America, presents a compelling proposition for Content Delivery Networks (CDNs) seeking faster content delivery to major markets. By hosting CDNs in a proposed Tier 4 data center, Guam promises reduced latency and a superior user experience to a vast audience. What sets this data center apart is its hardened structure, built resiliently against natural disasters such as typhoons. Such a fortified foundation assures CDNs of unparalleled reliability and continuous uptime, a factor paramount in their selection criteria. Furthermore, in today's era of environmental consciousness, the green initiatives of the data center act as a significant draw. Employing sustainable practices, the data center ensures cost-effective operations through renewable energy and supports corporate sustainability goals, a factor increasingly significant for global companies. The promise of 99.995% uptime, a hallmark of Tier 4 certification, further underscores the center's commitment to excellence.

Beyond infrastructure, if Guam's government offers incentives, it can greatly amplify the region's attractiveness. Moreover, the promise of robust connectivity, ensured by high-capacity submarine cables, makes a compelling case for CDNs to choose Guam as their hub. The island's emphasis on fostering a tech-savvy local workforce assures that the center's operations will be seamless and forward-looking. From a financial perspective, competitive pricing models can draw CDN providers, especially during the facility's initial phases. Collaborative opportunities with local educational institutions and tech incubators can spark innovation, providing CDNs with an environment ripe for growth and research. Through dedicated marketing campaigns that underscore Guam's unique benefits, complemented by testimonials and data-driven results, the island can successfully position itself in this region of the world, as a strategic, sustainable, and resilient hub, tailor-made for the future needs of CDNs.

Redressing today's undersea cable policies

1. **Improve Government Policymaking and Coordination on Undersea Cable Protection:** Governments should refine oversight, management, and protection strategies for undersea cables. Assigning clear responsibilities to specific agencies or inter-agency mechanisms, enhancing physical defense, and cybersecurity of landing stations, and streamlining procedures for at-sea repairs are crucial steps.
2. **Invest in Expansion and Incentivize Diversification of Undersea Cable Networks in the Indo-Pacific:** Strategic investments in the expansion and diversification of undersea cable networks can provide substantial returns. Assessing risks and identifying critical chokepoints. This also requires incentives to promote more varied cable pathways.
3. **Promote Partnership Among Regional Governments and Commercial Stakeholders:** The recently announced "Quad Partnership on Cable Connectivity and Resilience" in May 2023, demonstrates the value of collaboration. Such partnerships should be expanded to other Indo-Pacific countries to facilitate the sharing of best practices and technical expertise. Engaging companies involved in major undersea cable projects is essential to coordinate security and repair strategies.
4. **Improve Domain Awareness and Information-Sharing on Threats to Undersea Cables:** Enhancing information and intelligence sharing on cyber and physical threats to cables is vital. Indo-Pacific countries and industry stakeholders must collaborate to increase awareness and preparedness against potential dangers.
5. **Build Up Regional Capacity for Cable Repair:** Building regional capacity for cable repair includes creating a regional cable security fleet, investing in specialized unmanned systems, and collaborating on training and human capital

development. Supporting specialized training for regional coast guards and similar entities can promote capacity-building.

Policies around Guam and the undersea cables that serve the area have too often been overlooked. We can no longer afford to go without policies that aren't in the best interests of Guam and the U.S.

Addressing Fears of Competition with Private Data Centers:

Courting major networks, content providers, and Content Delivery Networks (CDNs) to a publicly-owned data center doesn't need to conflict with local data center efforts by ISPs. Instead, it's a strategic move that can enhance overall resiliency, serving different or complementary roles to those operated by local ISPs.

1. **Complementary Roles**: A publicly-owned data center can serve a different or complementary role to those operated by local ISPs. While ISPs may focus on localized services and specific customer segments, a public data center could target larger-scale operations, international connectivity, or specialized services that are not directly competing with local efforts.
2. **Differentiation of Services**: ISPs and a publicly-owned data center might focus on market segments, services, or solutions. The public center could specialize in large-scale hosting, cloud services, or international connectivity, while ISPs might concentrate on customized solutions for local businesses or consumers.
3. **Increased Resilience**: By diversifying the infrastructure and having public and private data centers, the region's resilience to disruptions and failures can be improved. This ensures continuity of services and could be viewed as a shared benefit rather than a competition.
4. **Community Engagement**: Open dialogues, community engagement, and transparent planning can ensure that all stakeholders, including local ISPs, have a say in how the public data center is developed and operated. This collaboration can help align interests and reduce potential conflicts.
5. **Sustainable Development**: A public data center could emphasize sustainable or green technologies that align with broader societal goals. This focus can attract different clients and partners, not necessarily competing with local ISPs.

The public data center would provide additional redundancy and disaster recovery layers, safeguarding against potential outages or disruptions. By reducing the reliance on a single point of failure, it ensures more robust and continuous services to the community. Typhoon Mawar highlights the urgent need for a robust interconnected

data center which is resilient and makes it possible for the island to maintain connectivity and data safety during a disaster.

Moreover, by enhancing connectivity and bandwidth, the public data center can benefit local ISPs by reducing latency and costs. Collaborative opportunities definitely exist, with joint ventures or partnerships creating win-win situations. The public center will stimulate economic growth and innovation without taking opportunities away from local ISPs, and both might focus on different market segments or services.

Open, honest, ongoing dialogue and community engagement can ensure alignment of interests and reduce potential conflicts. By focusing on resiliency, sustainable development, and engaging with all stakeholders, the situation can be transformed from a zero-sum game into an opportunity for growth, innovation, and mutual benefit for all.

A. Islandwide Middle-Mile Architecture

The five-year strategic plan highlights the urgency for a fortified and comprehensive middle-mile broadband infrastructure that offers Island Wide Coverage, especially in the vicinity of critical island anchor institutions. To realize this vision efficiently and cost-effectively, leveraging the existing broadband infrastructures of the Guam Power Authority and the Office of Technology (OTECH) is paramount.

The devastation to islandwide broadband services wrought by Typhoon Mawar brought into sharp focus the necessity for a robust, publicly-owned communication infrastructure in Guam. Post-typhoon, a large segment of the island found itself cut off from both internet and wireless services. This absence of connectivity didn't just isolate residents from each other, but also hindered multiple government entities' access to crucial emergency data and resources.

Compounding this situation, several carriers encountered unforeseen obstacles in swiftly reinstating services. In the vital hours post-disaster, their remedial actions were either slow or completely non-existent for a number of reasons, with some even failing to provide the Federal Communications Commission (FCC) with essential system status updates. As a necessary measure during this crisis, certain carriers had to prioritize restoring connections for vital government services, unfortunately sidelining broader community connectivity. Such decisions, while perhaps essential in the moment, further underline the importance of a publicly-owned, versatile communication system. Delays in restoring full services hamper immediate emergency responses, extend recovery periods, and escalate multitude risks for residents.

Typhoon Mawar, which hit in late May, revealed the vulnerabilities in the existing current technology infrastructure for internet services. Restoration has been highly inconsistent, with residents facing delays from days to weeks, and even up to three months, highlighting the inadequacy of the aging and vulnerable systems in place. As of this writing, (August 2023), many residents still remain without restored home internet. It would be irresponsible not to use funds to augment these existing systems with new public infrastructure running in parallel or replacing part of it with areas with new open-access and carrier neutral segments and a data center. Doing so would not only expedite the restoration process in the aftermath of such disasters, but also create a more resilient network necessary to achieve internet for all.

Here's how a publicly owned infrastructure could address these issues more effectively:

1. Centralized Decision-making: A single, unified body overseeing the infrastructure could act swiftly, avoiding bureaucratic lags typical of multiple, disjointed entities. Immediate resource allocation or communication channel rerouting would streamline the post-disaster response.

2. Uniform Hardening Measures: Consistent standards across all infrastructure components would mean all areas, irrespective of profitability or population density, would benefit from the same level of resilience.

3. Focused Investments: A public infrastructure would funnel investments into technologies and strategies explicitly aimed at withstanding typhoon-level disruptions instead of splitting priorities with profit-driven endeavors.

4. Wider Coverage: Ensuring even the remotest parts of Guam remain connected, especially during emergencies, would be a primary goal, bridging the communication gaps recently observed.

5. Integrated Response: A seamless integration with emergency services could facilitate faster evacuations, provide immediate medical assistance, and ensure residents receive crucial information in a timely manner.

6. Backup Systems: With redundant communication pathways and multiple backup power sources, the chances of complete outages, as witnessed recently, would significantly diminish.

7. Community Engagement: Direct communication with residents about infrastructure status, combined with preparedness drills, can ensure communities are better equipped to deal with emergencies, before, during and after.

8. Maintenance and Upgrades: Regular checks and updates would ensure the infrastructure remains in peak condition, reducing the likelihood of breakdowns during crucial times.

9. Transparent Reporting: With a mandate for clarity, residents would be updated more consistently and promptly about the state of communications, fostering trust in its government.

10. Dedicated Resources for Emergency: Quick-response teams, well-equipped and trained, would be ready for deployment, ensuring rapid restoration of services and reducing reliance on carriers to report status updates.

11. Facilitating the Mandatory Response Initiative: The Federal Communications Commission mandates that the carriers assist in connectivity for their customers during network outages, when possible. Additionally, it calls for them to form mutual aid agreements to share physical resources and collaborate during emergencies. They are required to enhance local government readiness for disasters, boost consumer preparedness, and improve public awareness and communication about restoration times. A public middle-mile network of towers, wireless, and fiber throughout the island could fill the gaps which may prevent this from happening during disasters, as it did during Typhoon Mawar.

12. Open Access: All providers will use this network without preference at reasonable wholesale prices. These prices are reduced from retail rates because the subgrantee doesn't have the costs associated with directly serving end users, like marketing and billing.

This obligation also requires carriers to offer an affordable middle-cost standard, as detailed in another section of this plan, which must meet the criteria specified in the Bipartisan Infrastructure Law.

In light of recent events, a shift towards a publicly owned, hardened, and resilient communications infrastructure isn't just a matter of efficiency—it's a necessity for the safety and well-being of Guam's residents.

B. Free Islandwide Wireless Internet Access

The Guam Power Authority already maintains an islandwide wireless system connecting to all metered locations on the island which could be a novel solution to providing free access islandwide.

However, as previously stated, this goal is achievable using current technology, a connected middle mile, partnerships, and some investment in easily obtainable, affordable equipment. This existing infrastructure, supported by islandwide middle-mile and significant infrastructure upgrades, is one way to achieve affordability and access goals.

We will explore all pathways to this goal. No matter the method, free municipal internet is not out of reach to ensure internet for all.

Introducing free islandwide wireless data service in Guam addresses the pressing issue of affordability, ensuring every resident has foundational access to the digital world. However, implementing this can raise concerns about competition with existing carriers. **Here's how this initiative can address affordability without undercutting carriers:**

1. Basic Access for All: Offering a complimentary basic tier above 'Unserved' but below 'Served' service ensures essential online access for everyone. Local networking experts have agreed that serving up to 50 Mbps/dl and 5 Mbps/ul– which is often an entry point for middle income households – is feasible. Existing carriers can still hold their ground, offering enhanced speeds and specialized packages that cater to varying user demands.
2. Gateway to Advanced Services: By introducing more individuals to the benefits of online connectivity, there's a higher likelihood they'll eventually seek advanced, paid services from carriers as their needs evolve.
3. Collaboration Over Competition: Partnering with carriers to design this service means shared responsibilities and benefits. It's a collective effort towards a digitally inclusive society.
4. Utilizing Existing Infrastructure: Instead of building from scratch, leveraging the current infrastructure, whether it belongs to carriers, the public, or both, means faster deployment.
5. Filling the Gaps: The free service can primarily target areas that carriers currently don't serve or are underserved, ensuring minimal overlap.
6. Boosting the Local Digital Ecosystem: With the ever increasing number of residents online, there's potential growth in local online enterprises, e-commerce, and

e-services. This expanded digital activity can indirectly lead to a higher demand for advanced carrier services.

7. Competitive Governance and Service Bidding: To keep government out of the direct ISP business, governance and certain service aspects can be bid out competitively. This ensures a dynamic, competitive landscape and leverages expert capabilities without overstepping government's boundaries.

The intent behind providing free islandwide wireless service is not to rival carriers but to create a foundation that is beneficial to all Guam residents, regardless of economic status. While everyone has access to free basic digital access, carriers remain indispensable for those seeking a more robust digital experience.

C. Comprehensive streamlined "Dig Once" Policy for Fiber Conduit

A "dig once" policy means that whenever there's construction work on roads or public spaces, conduits for internet cables are also installed at the same time. Not having such a policy can slow down the growth of internet infrastructure:

1. Costs Increase: Without this policy, internet companies might have to dig up roads multiple times whenever they want to lay down conduit or improve their cables. This can potentially increase the cost of internet services.

2. Lost Chances: Every time a road is built or fixed without these conduits, it's a missed chance to expand internet access affordably.

3. Repeated Work: Different internet companies might dig up the same spot at different times, causing unnecessary work and road damage.

4. Slower Internet Growth: Without a policy, providing internet to new places can take longer because each digging project needs its own set of approvals, tools and budget.

5. Bad for the Environment: Digging up the ground multiple times can potentially harm local plants and animals and increase pollution.

6. Disruptions to People: Digging up roads often can disturb local residents and businesses because of traffic delays and noise.

7. Uneven Internet Access: Without a clear plan, some areas might get too many conduits, while others get none.

8. Wasting Resources: Digging multiple times uses more workers, tools, and money than necessary.

9. Red Tape: For each separate digging project, companies need to get permission, which can slow things down to the detriment of the consumer.

By having a "dig once" policy and a clear plan for building conduits, we can ensure internet access grows quickly, cheaply, and smoothly. This means more people can get online sooner without extra costs or delays. It's like building a house and putting in the plumbing during construction, rather than adding it later – it's just smarter and more efficient.

D. A Fair Standard for Working Families

Setting a standard for Guam's carriers to provide commercial speeds at 100 Mbps download/20 Mbps upload without data caps and a straightforward price of $75 is not just beneficial, but necessary in the mission for internet for all. In meeting global standards, 100/20 Mbps is considered a low benchmark in much of the developed world. Guam shouldn't just aim to meet this but must be equipped to surpass it to stay relevant and competitive.

History has shown that carriers are resilient and are more than capable of modifying pricing structures for higher speeds or introducing other value propositions to entice subscribers. It's not about making sacrifices but thoughtful, consumer-centric adjustments.

For a household on a modest budget a consistent price of $75 ensures predictability, fostering trust with consumers and aiding in household budgeting. If we set this standard today, Guam will remain prepared for the inevitable digital advancements of tomorrow.

Data caps should also be prohibited. Unlimited internet access is a cornerstone for innovation, remote work, and educational opportunities, which collectively elevate the potential of Guam's residents.

If prices stay as they are, consumers might gravitate to pre-paid plans, turning essential internet access into a weekly choice against other essentials—essentially the broadband version of living paycheck-to-paycheck. Thus, constantly living under the threat of running out of data at any moment.

As stated in the BIL[8], "The Infrastructure Act's BEAD provisions are premised on Congress's determination that "[a]ccess to affordable, reliable, high-speed broadband is essential to full participation in modern life in the United States," and that "[t]he persistent 'digital divide' in the United States is a barrier to" the nation's "economic competitiveness [and the] equitable distribution of essential public services, including health care and education." Accordingly, each Eligible Entity must include in its Initial and Final Proposals a middle-class affordability plan to ensure that all consumers have access to affordable high-speed internet."

In setting this standard, Guam not only aligns with global benchmarks but also sends a clear message about its commitment to fostering a digital environment that is both progressive and consumer-focused.

E. Responsible Governance for Open-Access Publicly-Owned Internet

A franchise model for the governance of islandwide internet architecture essentially involves granting certain rights or privileges to private entities (or even public-private partnerships) to establish, operate, and maintain internet infrastructure in specific areas or throughout the island.

1. Framework Establishment:

- Regulatory Oversight: The Broadband Office oversees and enforces the standards and regulations for internet service provision. This ensures that the granted franchises adhere to the terms of their contracts and meet the needs of the island's inhabitants.
- Clear Guidelines: The governance body must set clear guidelines for franchisees, including service quality standards, pricing caps or guidelines, and any required investments in infrastructure or community services.

2. Franchise Bidding and Award Process:

- Proposal Call: Government opens a call for proposals to private entities or consortiums interested in obtaining a franchise.
- Evaluation: Proposals are evaluated based on technical capability, financial strength, proposed fees to the government, infrastructure investment commitment, and proposed consumer pricing.
- Award: The franchise(s) is awarded to the entity/entities that meet the criteria and offer the most beneficial terms for the island and its inhabitants.

[8] Infrastructure Act § 60101.

3. Operation Under the Franchise Model:

- Exclusive or Non-exclusive Rights: Depending on the strategy, a single entity could be given exclusive rights for a specific duration, or multiple entities could be granted non-exclusive rights to operate in different areas or sectors.
- Infrastructure Maintenance: Franchisees maintain the necessary infrastructure in line with the approved plan and in adherence to set standards.
- Service Provision: Franchisees provide internet services to consumers, adhering to pricing and quality standards set by the governing body.

4. Benefits and Revenue Generation:

- Franchise Fees: The governing body collects franchise fees, either as a lump sum, yearly payment, or a percentage of revenues.
- Shared Infrastructure: Existing public infrastructure, such as utility poles or ducts, can be leased to franchisees, generating additional revenue for the government.

5. Accountability and Quality Assurance:

- Regular Audits: The regulatory body conducts regular audits to ensure that franchisees fulfill their obligations.
- Consumer Feedback: A mechanism to collect and address consumer feedback ensures that the quality of service remains high and meets user expectations.

6. Periodic Review and Renewal:

- Contract Duration: Each franchise agreement has a set duration, after which it is up for renewal.
- Performance Review: Before renewal, the franchisee's performance is reviewed. If they have met or exceeded expectations, the contract can be renewed. Otherwise, the franchise may be opened up for new bidding.

7. Digital Equity and Inclusivity:

- Mandatory Coverage: To ensure digital equity, franchise agreements can mandate service provision to underserved or remote areas.
- Mandatory Affordability: Franchisees and participating carriers must offer lower rates to the consumer.

This model can work well if there's adequate oversight and the interests of the island's residents are prioritized. It balances the efficiency and innovation of private sector involvement with public sector oversight and objectives.

5.3. Workforce Development

Guam Workforce Empowerment Program

Introduction

The Guam Workforce Empowerment Program (GWEP) is a comprehensive workforce development initiative designed to bridge the skills gap, empower, and advance the local workforce in Guam. This program incorporates the Guam Community College Bootcamp and the Guam Economic Development Authority's (GEDA) High Tech Park, with the University of Guam computer science and cybersecurity courses, programs, and faculty, leveraging funding from the Broadband, Equity, and Access Deployment (BEAD) program through the Guam Office of Infrastructure Policy and Development. By collaborating with key stakeholders, GWEP aims to provide accessible and effective training opportunities, foster economic growth, and sustain development in the region.

Program Objectives

Skill Enhancement: Equip participants with in-demand skills and knowledge through specialized training programs, at various educational levels ranging from short-term entry level courses to certificates and degrees, that align with the evolving job market.

Employment Placement: Facilitate job placement opportunities by collaborating with local industries and employers, including local, regional, and federal government employers.

Career Advancement: Offer pathways for continuous skill and knowledge development and enhancement, and career growth to reinforce long-term employability.

Community Engagement: Engage with island communities to understand their needs, encourage participation, and promote inclusivity in the workforce.

Components of the GWEP:

Guam Community College Bootcamp

GWEP will collaborate with Guam Community College (GCC) to expand and strengthen its existing Bootcamp programs. These boot camps will focus on high-demand industries, such as information technology, healthcare, hospitality, construction, renewable energy, telecommunications, network engineering, and network architecture.

University of Guam Workforce and Career Development in Cybersecurity, Computer Science, and Data Science

The University of Guam will offer undergraduate and graduate coursework, certification, and degrees that will build upon GCC's bootcamp training, as well as other private and public-sector training and education, that will increase the skill level and areas of expertise for advanced level positions by providing a range of basic to specialized courses. Basic courses include introduction to computer science, Java I, Python I, HTML, CSS, and JavaScript. Fundamental courses include software engineering, data structure, and Algorithm, Python II, Linux, Java II, and Discrete Structure. Specialized course content includes network security, cloud computing, wireless and wired networks, network programming, Machine Learning/AI, web development, computer system defense, etc.

UOG will also leverage existing programs such as the NASA-funded UOG's Drone Corps that can map and monitor the island's broadband infrastructure. Existing geographic information system (GIS) faculty within UOG can also use their GIS expertise to train new professionals in GIS technology.

Curriculum Development

UOG and GCC, in partnership with industry experts, partner higher-education institutions, and support from the Guam Economic Development Authority (GEDA) and its High Tech Park, will design and develop specialized curricula tailored to meet the demands of targeted employment sectors.

The curriculum will emphasize hands-on training, practical experience, and emerging technologies in the professional development format. The curriculum provided by UOG will enable participants to identify and address cyber threats, perform data analytics and exchange, and deploy GIS services to support the investment in Guam's broadband infrastructure. Once the curriculum is in place, UOG will pursue designation as a National Security Agency Center for "Academic Excellence in Cyber Defense." The GWEP will provide funding to hire additional faculty and staff to develop and implement courses and new curriculum.

Additionally, UOG's Global Learning and Engagement unit (GLE) will offer refresher courses to enhance, upgrade, and update the existing technology workforce in local, federal, and private sectors.

In short, the entire scope of workforce development, from bootcamp to the development of technical leadership, will be encompassed within the GWEP framework.

Scholarships and Tuition Assistance

The GWEP, with funding from the BEAD program, will offer funding, scholarships and tuition assistance to eligible participants to reduce financial barriers and make the GCC bootcamps and UOG's coursework, programs, and certificates, more accessible to individuals from diverse socio-economic backgrounds.

Industry Partnerships

GWEP will foster partnerships with local industries and businesses, facilitated by OIPD, to create a direct link between training and employment. These partnerships will lead to internships, apprenticeships, and job placement opportunities for graduates of the bootcamps and UOG coursework, certificates, and programs. Participants can continue to enhance skills and knowledge development through higher level UOG courses, including a master's program in" Statistics and Data Science". UOG plans to develop coursework in Machine Learning/AI which will benefit GWEP participants who seek to learn emerging technologies and their application to Guam's broadband infrastructure.

Career Counseling and Mentoring

Professional career counselors and professional and faculty mentors, supported by GEDA, will guide participants through the program, providing guidance on career paths, personal development, and job search strategies.

Soft Skills Training

In addition to technical skills, the program will offer critical thinking skills, soft skills training, including communication, teamwork, problem-solving, staff leadership, and time management, to enhance overall employability.

Online Learning Platform

GWEP, with assistance from the High Tech Park, will utilize and strengthen the University of Guam's online learning platform to offer flexible and self-paced training options for participants who may have scheduling constraints or prefer remote learning. UOG's Center for Online Learning provides technical support for UOG's online environment. Each semester, over 100 UOG courses use the Learning Management System platform Moodle to deliver online content and engagement activities to ensure learning outcomes. This Learning Management System (LMS) can be strengthened to support GWEP and GEDA's High Tech Park initiatives.

Strengthening the Existing Network

UOG hosts the GOREX network and the neutral internet exchange MARIIX network. With support from GWEP, UOG will connect all educational institutions on the island. This will improve access to resources including speed, educational platforms, and learning management systems.

Strengthening Guam's regional partnerships with CNMI's Northern Marianas College is also a desired outcome.

Ongoing Support and Alumni Network:

GWEP will establish an alumni network to provide ongoing support, networking opportunities, and access to continued learning resources for program graduates.

Funding

The funding for the Guam Workforce Empowerment Program (GWEP) will be sourced from the Broadband, Equity, and Access Deployment (BEAD) program, administered by relevant government agencies. GEDA will play a crucial role in managing the program's financial aspects and ensuring transparent utilization of the funds.

Evaluation and Monitoring

Regular evaluations will be conducted to assess the program's effectiveness, job placement rates, participant satisfaction, and industry demand. Feedback from employers, participants, and program graduates will be incorporated to continuously improve the GWEP.

Conclusion

The Guam Workforce Empowerment Program (GWEP) aims to revolutionize workforce development in Guam by leveraging the resources of Guam Community College Bootcamp, the University of Guam's coursework, certificates and programs, Guam Economic

Development Authority (GEDA), and the High Tech Park, with funding from the Broadband, Equity, and Access Deployment (BEAD) program. Through this collaborative effort, GWEP will empower the local workforce, boost employment opportunities, and contribute to the sustainable economic growth of Guam and the region, while bridging the digital divide and promoting equitable access to opportunities.

5.4. Estimated Timeline for Universal Service

Year 1:

- Evaluate current infrastructure and survey residents to understand digital needs..
- Draft a Digital Transformation Strategy that aligns with the priorities set out and identify potential funding sources.
- Liaise with local and Federal authorities to understand regulations, secure necessary permissions, and establish bidding criteria for upcoming projects.
- Initiate bidding processes for infrastructure, Data Center construction, and other critical projects.
- Continued ongoing public engagement.
- Launch pilot digital literacy and technical training programs to uplift local skills.

Year 2:

- Start the construction of the Data Center and further infrastructure development, laying the foundation for future internet access systems.
- Roll out the terrestrial broadband infrastructure development and commence procurement processes for the undersea broadband.
- Coordinate with local and national policy-making bodies to ensure policies facilitate the rapid deployment of free islandwide internet.
- Begin engagement with Content Delivery Network (CDN) providers to market the upcoming Data Center.
- Expand and scale the workforce training programs, focusing on digital literacy and technical skills.
- Continued ongoing public engagement.
- Develop and test the initial phases of the free islandwide internet system.

Year 3:

- Align closely with Guam's policies to streamline deployment and reduce potential bureaucratic barriers.
- Enhance efforts to digitally preserve Guam's indigenous culture, partnering with local institutions and community groups.
- Prioritize the enablement of gigabit access for key community anchor institutions.
- Broaden the coverage and reach of the free islandwide internet system, focusing on underserved areas.
- Train and equip educators, community leaders, and public representatives in digital literacy and its benefits.
- Continued ongoing public engagement.
- Finalize CDN partnerships, ensuring Guam's Data Center offers robust and resilient services to attract global CDN providers to reduce latency.

Year 4:

- Continuously monitor and refine partnerships with CDNs, ensuring the Data Center remains competitive and attractive.
- Refine and optimize the free islandwide internet system based on feedback and usage data, ensuring optimized coverage and speed.
- Double down on digital equity initiatives, ensuring they align with the State Digital Equity Plan and that all residents benefit equally from digital advancements.
- Continued ongoing public engagement.

Year 5:

- Conduct a comprehensive assessment of the 4-year transformation journey, identifying areas of success, areas for improvement, and strategizing for the next phase of digital growth.
- Continued ongoing public engagement.
- Foster deeper collaborations with policymakers, aiming to shape future strategies and policies that support Guam's digital aspirations.

5.5. Estimated Cost for Universal Service

In order to guarantee the most effective and responsible use of resources, cost estimates for our planned activities will be carefully defined by OIPD during the formulation of the Initial Proposal under the BEAD Program. Our commitment to fiscal responsibility is unwavering, ensuring every dollar is maximized. Should any funds remain after accomplishing our BEAD objectives, they will be strategically redirected to fortify our Digital Equity initiatives. This approach reflects our dedication to the BEAD program and underscores our holistic vision for digital inclusion and equity in Guam for all.

5.6. Alignment

Digital Inclusivity and Accessibility:

Guam's Five-Year Action Plan starts with a foundational promise: ensuring that every resident, no matter where they are or their financial standing, can access high-quality internet. This alignment isn't just a line on paper; it echoes Guam's broader mission for social equality, ensuring all citizens, from every walk of life, have equal opportunities to tap into online education, healthcare, and other essential resources for personal and professional growth.

Economic Growth and Diversification:

A major tenet of the plan is to weave a robust digital infrastructure to attract global businesses while nurturing the local entrepreneurial spirit. This goal isn't isolated; it's an integral part of Guam's larger economic blueprint. The island is steadily working to diversify its economy, bolster local businesses, and stake its claim as a nexus for various regional and international sectors.

Education and Workforce Development:

The Action Plan isn't just about wires and signals; it's about people.It aims to equip the island's residents with the digital skills they need, ensuring they're not just consumers but contributors to the digital era. This objective aligns snugly with Guam's overarching educational strategies, prepping its workforce for the future's job market.

Infrastructure Enhancement and Modernization:

The plan recognizes that for digital dreams to become a reality, the groundwork—quite literally—has to be strong and resilient by advocating for the modernization of current internet infrastructure and integrating cutting-edge tech solutions, ensuring every sector is built on a modern, resilient foundation.

Community Engagement and Awareness:

Guam believes in the power of its community. Thus, the plan emphasizes village-to-village town halls, public consultations, and outreach programs. This drive for community-centric awareness aligns with Guam's spirit of keeping its residents informed, engaged, and at the heart of every initiative.

Partnerships and Collaborations:

No plan can thrive in isolation. Recognizing this, the Action Plan champions strong collaborations with ISPs, tech giants, and other key players. This collaborative spirit reflects Guam's broader strategy, where public and private sectors work in tandem, driving mutual growth.

Sustainability and Resilience:

Situated where it is, the Guam community inherently embraces the character of resilience. The plan, therefore, underscores the need for an internet infrastructure that's not just state-of-the-art, but also resilient to natural challenges. This aligns with Guam's ongoing efforts to combat the effects of climate change and build an adaptable and enduring future.

5.7. Technical Assistance

To guarantee that Guam's Initial and Final Proposals resonate with the BEAD Program's objectives and statutory requirements, Guam will need a comprehensive blend of technical, strategic, and administrative support. Below is a concise overview of needed assistance:

1. Technical Expertise:

Broadband Infrastructure Assessment: An evaluation of Guam's current broadband landscape to pinpoint areas for enhancement and growth.

Network Design & Optimization: Guidance to architect an efficient network tailored to Guam's unique geographical and infrastructural challenges.

Speed and Latency Solutions: Tools and knowledge to optimize internet speed, considering Guam's location and latency challenges.

Cybersecurity Protocols: Ensuring that Guam's digital infrastructure meets top-tier security standards.

2. Regulatory Guidance and Compliance:

BEAD Program Navigation: Dedicated experts familiar with BEAD's nuances to oversee adherence to the program's guidelines.

Permitting and Licensing: Assistance in acquiring necessary local and federal permits, ensuring harmony with both Guam-specific and broader regulations.

3. Strategic Framework:

Stakeholder Collaboration: Mechanisms to foster collaboration between local businesses, residents, ISPs, Legislative, and other government entities..

Financial Analysis: Expert evaluation of funding models, ensuring sustainable and effective resource allocation.

Implementation Strategy: A detailed plan outlining each phase, from inception to execution and monitoring-keeping Guam's specific needs central.

4. Budgeting and Financial Modeling:

Funding Strategy: Guidance on leveraging federal grants, local funding, and potential private sector investments.

Efficient Budget Allocation: Expertise in directing funds towards areas with the highest impact and long-term benefits for Guam.

5. Capacity Development:

Local Workforce Training: Initiatives to equip Guam's workforce with the necessary skills to execute and maintain broadband upgrades.

Recruitment Assistance: Identifying and integrating key personnel with specialized skills into the project.

6. Documentation & Reporting:

Proposal Crafting: Professionals adept at BEAD's expectations to craft compelling, clear, and comprehensive proposal documents.

Performance Metrics: Systems to continuously monitor, assess, and adjust based on real-time data and feedback.

7. Community Engagement:

Feedback Channels: Establishing clear avenues for Guam's residents to share their insights, ensuring the proposals are genuinely inclusive.

Public Awareness Initiatives: Programs that explain the benefits of the BEAD initiative, underscoring its importance for Guam's digital future.

Securing the above will empower Guam to devise and present proposals that not only align with BEAD's stipulations, but are also holistically tailored to fulfill the territory's broadband aspirations.

5.8. Subgrantee Evaluation and Award Process

The Office of Infrastructure Policy and Development (OIPD), Guam Broadband Initiative, and Guam Digital Equity Initiative, are committed to ensuring a fair and transparent process for evaluating grant applications. OIPD welcomes all eligible organizations to submit their grant or subgrantee applications for consideration.

To ensure a fair evaluation process, OIPD requires that all grant applications be submitted in a standardized format, which will be made available on our website. The application should include a detailed project description, budget breakdown, and measurable outcomes. Applicants must also demonstrate a clear understanding of the needs of the community they seek to serve and the ability to implement the proposed project effectively.

To ensure alignment with our mission, OIPD requires that grant applications be scored on their merits of alignment with the Broadband Equity Access and Deployment federal grant. We strongly encourage applicants to review this grant program's eligibility criteria and requirements before submitting their application.

All grant applications will be evaluated by a committee of subject matter experts who will assess each application on its own merits. Applications will be scored based on several factors, including the proposed project's potential impact on the community, the project's feasibility, the applicant's capacity to implement the project successfully, and the alignment with the Broadband Equity Access and Deployment grant program.

OIPD is committed to a fair, objective, and transparent evaluation process. All applicants will receive a notification of the decision on their application, and we welcome any questions or feedback on the evaluation process.

To apply, interested organizations must follow the steps below:

1. Review the grant guidelines and eligibility requirements on the OIPD website.

2. Complete the grant application form and submit all required documentation, including a detailed project proposal and budget plan. Unless otherwise indicated, deadlines will be 5 p.m. (Chamorro Standard Time) of the stated deadline, emailed to broadband@guam.gov in PDF format.. Any proposals received after the deadline will not be accepted. . An original hard copy and a number of copies to be determined by OIPD must be submitted to the Office within the first 5 days of the deadline.

3. The question and answer period to OIPD will be determined by OIPD,, and announced in the published advertisement in a local newspaper of general circulation.

4. Applications will be evaluated and scored based on their alignment with the Broadband Equity, Access, and Deployment (BEAD) federal grant.

5. Finalists will be notified and may be invited to submit additional information or participate in an interview with the OIPD.

6. Grant recipients will be notified and provided with detailed instructions for next steps, including project reporting and compliance requirements.

5.9. Subgrantee Post-Award Monitoring

1. **Develop a Monitoring Plan:** Create a detailed plan outlining what areas, activities, and performance indicators will be assessed during the monitoring process. Align this plan with the grant agreement and compliance requirements.
2. **Schedule Monitoring Visits:** Coordinate with the subgrantee to schedule monitoring visits or assessments at their location or through remote means, depending on the nature of the grant and subgrantee activities.
3. **Conduct Initial Meeting:** Start the monitoring process by meeting with the subgrantee to explain expectations, review the monitoring plan, and address any questions or concerns.
4. **Assess Financial Management:** Review the subgrantee's financial practices, including budget usage, record-keeping, and adherence to cost principles mentioned in the grant agreement. Ensure that expenses match the approved budget and are appropriately documented.

5. **Evaluate Program Performance:** Assess the subgrantee's program performance by examining progress reports, program deliverables, and performance metrics in the grant agreement. Evaluate how practical their activities are in achieving the intended outcomes.
6. **Compliance and Regulatory Review:** Ensure the subgrantee complies with all relevant federal, state, and local regulations, as well as any specific compliance requirements outlined in the grant agreement. This may involve reviewing documents, policies, procedures, and adherence to applicable laws.
7. **Document Findings:** Keep detailed records of the monitoring activities, including observations, findings, and any identified issues or areas for improvement. Use a consistent reporting format to record information accurately.
8. **Provide Feedback and Recommendations:** Share the findings with the subgrantee, highlighting successes and offering constructive feedback on areas that need improvement. Make recommendations for corrective actions or enhancements to ensure compliance and program effectiveness.
9. **Follow-Up and Corrective Action:** Establish a follow-up process to address any identified deficiencies or non-compliance issues. Monitor the implementation of corrective actions and offer necessary support or resources to assist the subgrantee in meeting compliance requirements.
10. **Ongoing Monitoring:** Depending on the grant agreement, create a schedule for ongoing monitoring to assess the subgrantee's progress and compliance throughout the grant period. This may involve periodic site visits, regular reporting, or other monitoring activities.
11. **Documentation and Reporting:** Maintain accurate records of the monitoring process, findings, corrective actions, and any communication with the subgrantee. Prepare and submit monitoring reports as required by the grant agreement or regulations.

6. Conclusion

By charting a new course for a digitally inclusive future, Guam's five-year action plan embarks on an ambitious journey to revolutionize its internet landscape, with the promise of swift, accessible, free and affordable connectivity for every Guam resident.

In just a few years, Guam aims to redefine its digital future by resolving latency, amplifying speeds, and guaranteeing affordable internet for all.

Universal Access: We're pushing boundaries with the ambitious target of free internet, ensuring digital inclusion for every resident.

Innovative Data Center: By building a state-of-the-art data center, Guam is set to become a hub for global content providers, addressing latency and boosting the economy.

Closing the Digital Gap: Our strategy is laser-focused on connecting every nook of Guam to top-tier broadband.

Tech Partnerships: By teaming up with Carriers, the University of Guam, the Guam Community College, Utilities, and other industry experts, we will leverage the latest tech to refine our infrastructure and ramp up speeds.

True Affordability: Beyond universal access, we're working with providers and launching support programs to make the internet even more affordable for those in need.

Creating jobs: Our focus is also on upskilling – through partnerships, training, and education, we're prepping our workforce to lead and maintain our digital transformation.

Guam's strategic plan for the next five years described above, focuses on delivering affordable and accessible internet to every resident. By investing in advanced infrastructure such as a state-of-the-art Data Center and initiating broad-reaching internet access programs, we aim to enhance connectivity, reduce latency, and foster economic growth. This commitment ensures that every individual, regardless of their economic background, will have the opportunity to benefit from reliable and high-speed internet services. We welcome conversations with all who support or have questions about our vision. Si Yu'os ma'åse' para todus hamyo! Biba internet for all! Biba Guam!

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7. Addendum: Possible Project Proposals

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August 21, 2023

INCLUSION TO THE GUAM BEAD FIVE-YEAR ACTION PLAN

1 GUAM MEMORIAL HOSPITAL AUTHORITY INTRODUCTION

A high-speed Internet connection used to be a nice-to-have, but today, it is a necessity. In 2020, the coronavirus pandemic highlighted that the Internet is for more than just entertainment; it is *essential* to have continuous access to healthcare, education, work, and other professional services. Since March 2020, the federal government has dedicated over $65 billion in federal funding to make sure that no one in the country is ever left behind because of lack of Internet access again. The island of Guam is on track to receive more than $150 million from this historic investment. The largest of all funding pools, the Broadband Equity, Access, and Deployment (BEAD) Program prioritizes building high-speed Internet access to unconnected (i.e., unserved) residential locations, and to communities with underperforming Internet connections (i.e., underserved). Guam will see close to $156 million under the BEAD Program alone to connect an estimated 10,000 who cannot connect to the Internet at home or are relying on outdated technology to get it.

The Government of Guam Office of Infrastructure (01) is the designated BEAD Program lead, in addition to leading the coordination of all other broadband efforts in the Territory. 01 is partnering with various government agencies, community organizations, the telecom industry, and others to understand each community's greatest needs to develop a broadband action plan to answer those needs as we work toward a common goal of ensuring all residents are fully equipped to participate and thrive in a digitally connected world. This broadband deployment plan has two parts: infrastructure and education.
Guam will take several actions to achieve its two main objectives of building infrastructure and providing digital literacy support services: (I) Internet buildout to unserved and underserved residences; (2) Community Internet Access Hubs, where residents can access high-speed Internet within their community; (3) Development of a "State of the Internet" map for Guam showing unserved and underserved locations, locations served under other funding, Community Internet Access Hubs and locations for digital literacy programs; (4) A community "Digital Navigator" program, where residents with high digital literacy skills teach those with little or no digital literacy skills how to navigate devices and the web; (5) Community outreach and engagement activities to educate residents on the Internet-for-all initiative and the need for Internet, and learn more about Internet and digital literacy needs across our Island, and; (6) Broadband outreach, training, and education content creation for public distribution.

Guam's target to achieve universal access to the Internet relies on the combination of BEAD funds through 2027 with other federally funded commitments, the ability to overlay effective and affordable Internet access alternatives for very high-cost areas, and related key middle mile (submarine and terrestrial fiber) investments expected to be completed by the end of

2026. Current funding supports continuous improvements to Internet connectivity in our Island through 2030, with a look toward creating a sustainable Internet access market for years to come.

2 GUAM MEMORIAL HOSPITAL AUTHORITY INCLUSION IN THE GUAM BEAD FIVE-YEAR ACTION PLAN

Guam will provide universal access to high-speed Internet for most if not all residents by 2030. Our public sector together with our community service providers and private employers, will work to maximize the benefits of this historic investment of public funds to achieve this. Residents will be connected via modern fiber optic or similar service to guarantee high-speed (l00Mbps or better) access.

The Guam Memorial Hospital Authority (GMHA), the only public hospital in Guam, is one of the Community Anchor Institutions (CAI) on island. BEAD represents the largest of the federal broadband funding programs and prioritizes last-mile support for our unserved and underserved communities. Taken together, the long list of federal programs will ensure we have reliable, affordable, and sustainable efforts addressing our first-, middle- and last-mile infrastructure needs, as well as robust community-based services aimed at achieving digital equity and literacy in order to support a digitally literate workforce of the future. By 2030, Guam envisions communities where most if not every resident has meaningful access to reliable and affordable high-speed Internet, bolstered by a strong digital equity program. This will enable all of our residents to fully participate in a digitally enabled world where online services are ubiquitous and technology is woven throughout our society. Our goal is to embed resources within communities by training digital navigators local to the area, and offering technology literacy training and other digital equity services tailored to the community's particular needs. The island hopes to engage existing CAis (e.g., hospitals, schools, libraries, and other public facilities) across the island as partners as we discuss ways to support them as we hope to potentially expand their offerings to include neighborhood-based community digital hubs where we can bring together residents in need with digital navigators and other resources to help them overcome the barriers to adoption of high-speed Internet services.

The BEAD program broadly supp011s this vlslon by prioritizing new connections to unserved and underserved locations, raising the floor for all connections to the Internet to at least lO0Mbps, and ensuring the deployment of gigabit service to CAis. BEAD also supports critical training for building skills to overcome the legacy hurdles to adoption of technologies. GMHA is looking at participating and benefitting from the Guam BEAD program, most especially in upgrading the Hospital-Wide Network Infrastructure to include increased broadband internet connectivity and cybersecurity readiness for the hospital, the employees, the patients and their families.

3 HOSPITAL WIDE NETWORK INFRASTRUCTURE UPGRADE

The Guam Memorial Hospital Authority's (GMHA) current network infrastructure is made up of mix plate of mostly outdated as well as some fairly new network equipment and network backbone connectivity comprised of a mix of older CAT-5 and newer CAT-6 network cabling and a recent addition of some newer fiber optic network connectivity. The older network equipment and connectivity cabling in use are beyond the economic life cycle expectancy of 5 to 7 years old, and the continued use of these older network resources results in an increasing occurrence of intermittent network stalls and hang ups as well as outages. With the recent implementations of the hospital's new Cloud Based EHR Systems Upgrades which are more network dependent applications there are obvious increases of network congestion and high rate of collisions, due to a network media shared among all of the 800 plus wired and wireless network computer workstations and printers throughout the hospital, the Skilled Nursing Unit, and the DOC Clinics.

The GMHA IT Department had the foresight and had tried to justify in the past the need to upgrade the hospital wide network infrastructure in preparation for the EHR Systems Upgrades and to appropriately plan for the expected growth and network traffic increases but prior leadership at that time did not warrant this planned upgrade as a priority and therefore did not want to approve or budget for this network upgrade. So now that we have outgrown our old network infrastructure we have been experiencing the network problems as a result of not upgrading the hospital network infrastructure and it is becoming very frustrating and counter-productive for all of our end users from Physicians to Administrators to Clinical, Ancillary, Fiscal and Operations users' hospital wide and to the IT support staff. Internet access through wired and wireless connectivity is not at 100% hospital-wide, there are numerous areas with the facility that does not have maximum or up to par internet connectivity. The time is now for GMHA to upgrade our Network Infrastructure Hospital-Wide, and the BEAD program can certainly provide the vehicle and resources for GMHA to accomplish this.

3.2 REASONS TO UPGRADE THE GMHA NETWORK INFRASTRUCTURE

- To replace all of the older network equipment (hardware and software) to include network servers, switches, routers, wireless concentrators, wireless access points, hubs, UPS's, framework servers, client workstation servers, firewalls.

  To replace the entire network connectivity backbone with a dual ring (Multi-Mode) fiber optic network backbone for redundancy for fail-over instantaneous roll-over with standardize consistent fiber optic high speed connectivity from the main firewalls and routers up to every network tier layer switches and continue branching out to every department network switches, then replace all CAT-5 and CAT-6 cabling with new CAT-SE network cabling from department switches out to every network computer workstation, printers and wireless access points.

To implement layered security solution throughout the entire network to protect the existing investment in infrastructure and equipment and the critical resources that reside on the network from today's ever increasingly sophisticated attacks. A layered security solution that is made up of multiple layers of complementary security technologies, all working together to provide the required level of protection by deploying firewalls, virtual private networks (VPN), antivirus and intrusion detection and prevention, denial of service, and user access security.

Upgrade current Internet (upload and download) bandwidth from 1 GB 10 GB to increase the GMHA Internet access bandwidth capacity which will significantly increase the network speed and response times.

To expand the internet access and broadband connectivity throughout the entire main hospital facility and the Skilled Nursing Facility eliminating "dead spots" as well as access from the parking lots.

All of these above mentioned network upgrade activities will result in a significantly improved faster network throughput which will more than satisfy the network end users and will ensure that the network connectivity and speed is maintained and running at the very least at 99.9% of the time and will have fail-over roll swapping, should the primary network fail for whatever reason, because of the dual ring fiber optic connectivity.

3.3 NETWORK INFRASTRUCTURE UPGRADE SOLUTION

The following provides a complete list and cost estimates for all of the equipment and resources needed to upgrade the **GMHA** Network Infrastructure to improve internet connectivity and broadband both wired and wireless:

Description of Item	QTY	EST. UNIT PRICE	EST. EXTENDED PRICE
1. Fiber Optic Dual Ring Network Infrastructure Connectivity Hospital Wide to include Multi-Mode fiber optic cabling and Innerduct flexible conduit - with design, labor and material to install (see attached layout)			$400,000.00
2. CISCO 48-Port Smart Managed Network Switches with Power over Ethernet (PoE)	12	$8,800.00	$105,600.00
3. CISCO 24-Port Smart Managed Network Switches with Power over Ethernet **(PoE)**	24	$4,400.00	$105,600.00

4. CISCO or Juniper 16-Port Smart Managed Network Switches with Power over Ethernet (PoE)	24	$2,800.00	$67,200.00
5. CISCO Wireless Network Access Points for entire Hospital & SNU	40	$450.00	$18,000.00
6. Application Servers (Rack Mountable) for Network Client Workstations with Windows Server 2012 Operating System	6	$8,000.00	$48,000.00
7. Network DNS Security Firewall with powerful Internet Filtering solution with AI-Driven threat Intelligence that blocks Malware, Ransomware, and Phishing	2	$100,000.00	$200,000.00
8. SmartPro 120V 500VA 300W Line-Interactive UPS, 1U Rack, Network Card Options, USB, DB9 Serial	65	$300,00	$19,500.00
9. Acquire Internal Network and External Network risk assessment services and network penetration testing to certify new network infrastructure after all installed.	1		$35,000.00
10. Upgrade existing Business Internet Bandwidth from 1 GB to 10 GB and upgrade network connection bandwidth to SNU from 1 GB to 10 GB. Estimated Annual recuming cost for these upgrades is $130,000.00, from two separate Internet Service Providers for redundancy.	2	$130,000.00	$260,000.00
11. Labor to install, configure, test, certify Network Infrastructure Upgrade, and training of GMHA IT Staff.	1		$300,000.00
TOTAL=			**$1,558,900.00**

4 GUAM COMMUNITY INCLUSION IN BEAD PROGRAM

The opportunity for greater public access points through community hubs and public spaces where residents already gather is tremendous. Existing communication channels and trust networks can be built up to connect unserved and underserved populations through hospitals, libraries, community health centers, community centers, vocational programs, churches, and even personal relationships. Rural communities especially highlight the need for increased public access points, where experiences paint the picture, such as residents driving to a highways pullout for connectivity for a virtual job interview, seniors asking neighbors for help with virtual telehealth appointments or video calls with their grandchildren living across the country; or those needing language support asking friends with computers to translate simple websites that do not support their language or allow them to perform simple functions on their mobile phone.

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The Island of Guam will need to engage medical clinics, federally qualified health centers (FQHCs), hospitals, and health insurance companies to identify households that do not have access to telehealth services because they have: (1) unreliable Internet service; (2) no devices with Internet connectivity capacity; (3) or do not know how to use a computer, tablet, or other mobile device with Internet connectivity. Likewise, the island will need to engage the library system to determine the total number of patrons who visit the library because they cannot or do not have access to reliable Internet service at home. Additional work with the Guam Department of Education and alongside the Guam Community College and the University of Guam will hope to provide a clearer understanding of the limitations of technology and Internet access to participate in online schooling.

Special consideration is needed in Guam's overall strategy to support residents that may Jive in locations with suitable access to high-speed Internet but may not have suitable space or arrangements in their residence to support meaningful use of that access. There are also residents that are homeless or houseless, without access to a traditional residence, who would potentially utilize CAis or other public Wi-Fi locations as their preferred (or only) means to access high-speed Internet service. Both public and private organizations already offer free access to Wi-Fi based service at a growing number of locations throughout Guam. The growth of capacity at CAis, together with an increasing desire to utilize free Wi-Fi access as a means to attract customers, will help to accelerate that growth. The State may consider the addition of such free Wi-Fi access locations as a useful layer to its comprehensive public outreach efforts. While typical Wi-Fi offerings have limited range and performance and would otherwise be considered unserved by the strictest NTIA definition, the mesh of public Wi-Fi services would add to the convenience of home Internet access for the general public.

VINCE C. QUICHOCHO
Hospital IT Administrator

Approved by:

LILLIAN PEREZ-POSADAS,MN,RN
Hospital Administrator/CEO

8/23/2023
DATE

From the Office of Homelessness Assistance and Poverty Prevention (OHAPP):

From the Office of Homelessness Assistance and Poverty Prevention (OHAPP), the BEAD is a great opportunity to assist those facing homelessness and those in poverty. Based on the recent census numbers Guam's population is 153,836 with 34,804 family households. 27% of the population are minors. There are 145,543 people in households for whom poverty status is determined. 29,408 (20.2%) had income below the poverty level. Addressing internet affordability and connectivity for families with young children is imperative for education, employment and sustainability.

OHAPP supports all the efforts outlined in the Guam Broadband Infrastructure five year plan. The Guam Homeless Coalition also created an action framework to improve homelessness and poverty response from the Government of Guam side and the local stakeholders. There are action items that address internet connectivity and access to technology.

OHAPP would like to present suggestions for BEAD funding:

- Free connectivity/ wireless internet at all Guam public housing developments (AMP 1,2,3,4, Guma Trankilidat), or consider public housing developments as CAIs
- Free public wireless internet at all Government agencies and government buildings
- Have translated websites for government agencies (Languages: Tagalog, Chuukese, Korean, etc…)
- K-12 school curriculum for technology and related subjects to increase functionality in a digital dependent world

OHAPP believes these changes would go a long way in providing greater access to homeless individuals and an opportunity to break the cycle of poverty for growing families.

We appreciate accepting feedback from OHAPP. Si Yu/os Ma'ase.

UNIVERSITY OF GUAM (UOG) PROPOSAL

Advancing Digital Equity on Guam through Education and Workforce Development

PROJECT NARRATIVE

About the University of Guam

The University of Guam (UOG), a Minority-Serving Institution (MSI) and Asian American Native American Pacific Islander-Serving Institution (AANAPISI), is an open‑admissions, semester‑based, U.S. Land Grant and Sea Grant public comprehensive university offering 15 master's degree programs and 25 bachelor's degree programs in both onsite and online course offerings. The University is accredited by the WASC Senior College and University Commission and is the only U.S. accredited four-year institution of higher education in the western Pacific. Established in 1952, the institution was first accredited as the University of Guam in 1968. The University of Guam was designated as a USDA Land Grant university in 1972 and designated as a Sea Grant Institution in 2022. The University employs approximately 800 personnel, and it is a $100+M organization. Located in the municipality of Mangilao, UOG serves the entire western Pacific region. UOG is designated as Guam's Economic Opportunity Zone 9530.

UOG currently offers four graduate degree programs online: MEd Reading; MEd Elementary Ed (in partnership with Palau Community College); MEd TESOL; and Professional MBA. The University's first Doctor of Education online program is expected to launch in Fall 2024, the Master of Accountancy launched in 2022, and a Master of Library Science as a hybrid program is also expected to launch in 2024. At the undergraduate level, UOG offers 109 courses online or in hybrid format with more online courses under review in general education and accounting as well as articulation agreements with schools regionally, nationally, and internationally for fully online coursework. With the demand for online instruction and a pivot to virtual platforms, the University has also focused on capacity building—with Online Teaching Certification courses, built on the Online Teaching Consortium curriculum. These are intense, two-week asynchronous training sessions with pre-determined deliverables using UOG resources for online delivery. About 136 faculty have completed at least one training level as of May 2023.

With an enrollment of 3,449 students (1,396 or 40.5% male and 2,053 or 59.5% female) in the academic year 2020-2021, the University of Guam comprises a student body of 46% Pacific Islander, 46% Asian, and 9% other (White, non-Hispanic, Black non-Hispanic, Hispanic, American Indian/Alaskan Native). UOG's student demographics from the 2020-2021 Fact Book indicate that of the 3,449 students enrolled in Fall 2020, 46% identified as Pacific Islanders, 41.1% identified as Asian-Filipino, and 3% identified as White/Non-Hispanic. The Pacific Islander designation includes Chamorross, the indigenous peoples from Guam and the CNMI, Yapese, Pohnpeian, and Chuukese students from the FSM, and students from the Republic of Palau and the Republic of the Marshall Islands. UOG serves a historically disadvantaged population as approximately 47% of its undergraduate student population receives Pell Grants. Moreover, as an open admissions institution, UOG has a 41.2% six-year completion rate; a significant achievement compared to peer institutions. This data underscores the positive impact this project will have on individual lives and in improving the digital infrastructure and equity in our community

UOG has a long history of successfully managing large grants, including a Five-year $20M NSF Established Program to Stimulate Competitive Research (EPSCoR) grant, an $8.6M construction grant from US EDA, a $3.7M Health and Human Services grant to develop geriatrics workforce enhancement, a $25K NASA award (sub-award from the University of Hawaii at Manoa) for autonomous control technology for unmanned aerial systems with agriculture and environmental applications in the central Pacific Islands, a $7.3M NCI grant to support research in health inequity related to cancer, and a $2.3M NSF INCLUDES grant to support underrepresented students in engineering and science, and more than 150 other grants. Importantly, the University of Guam's audits have no questioned costs on $30M+ worth of annual grant activity for seven (7) consecutive years. UOG is confident it can commence the project promptly and commit the funds quickly and effectively and in compliance with federal regulations.

UOG's BEAD Funding Proposal

UOG's proposal includes three (3) goals that will significantly improve Guam's broadband infrastructure through expansion and hardening of current resources, construction of two (2) new facilities, and development of much needed educational and training programs to prepare Guam's workforce to manage, protect, and maintain investments made to the island's broadband infrastructure. Each of the goals are outlined below to provide further details on how UOG will implement these components to support and provide equity and access to Guam's broadband infrastructure.

GOAL 1.			
Program Goals	**Objectives**	**Outputs**	**Impacts**
Build broadband and IT Capacity.	1. Implement a 100Gbps network core with a minimum of 25 Gbps resilient network backbone throughout the campus.	-Wi-Fi 6 connectivity throughout campus -Hyflex/Hybrid classrooms - Connectivity to other educational institutions on-island - Island wide connectivity through MARIIX -strengthen the research education exchange GOREX	Increased Broadband accessibility and connectivity.
GOAL 2.			
Build an IT workforce in cybersecurity and computer science at a variety of levels.	1.Construct a new two-story 10,000 sq. ft. facility to house the cyber security, computer science, and mathematics programs needed to build Guam's IT workforce. Construct computer labs, classrooms, faculty offices. 2.Hire Senior Researcher to facilitate 2+2 Computer Science (CS) Program with Guam Community College and other regional institutions. 3. UOG pursued designation as an NSA Center of Academic	Serve 15 to 20 students annually enrolled in the CS Program and STEM field and 20 to 30 UOG IT engineers, analysts, and specialists. Prepare a technology workforce at various skill levels to protect, maintain, and support investments in Guam's broadband infrastructure.	Faculty builds capacity of upcoming IT professionals on island and in the region. Lab allows students and IT personnel for hands-on training in cybersecurity and other network courses.

	Excellence in Cyber Defense (CAE-CD).		
GOAL 3.			
Provide a robust data center for the government of Guam.	1.Construct a 15,000 sq. ft. Data Center/Office of Information Technology 2. Provide training for 20 to 30 IT engineers, analysts, and specialists per year. Up skill UOG OIT employee level of training.	Provide training for 20 to 30 IT engineers, analysts, and specialists per year. Up skill UOG OIT employee level of training.	Manage and protect data center resources and services available for Guam

Project Objectives in Detail

Goal 1. Objective 1.

Implement a 100Gbps network core with a minimum of 25 Gbps resilient network backbone throughout the campus. The upgrade in UOG bandwidth and capacity will provide a more robust and scalable network infrastructure It can provide the capacity to provide educational institutions with more online resources, provide more on-island bandwidth through an update to the Mariana Islands Internet Exchange (MARIIX), and implement UOG campus Hyflex/Hybrid online classrooms. The full upgrade of the network infrastructure is estimated to cost about $2.5M.

Goal 2. Objective 1.

Construct a new two-story 10,000 sq. ft. facility, Computer Science, Cyber Security, and Mathematics building. to house the cyber security, computer science, and mathematics degree programs/certificates training needed to build Guam's IT workforce. The facility will include training labs for cyber security, classrooms, and faculty offices. The estimated cost is $1000 per square foot for $10M.

It is critical for the UOG 2+2 program with Guam Community College and other regional institutions to have a computer lab with the appropriate equipment to build hands-on skills in the

areas of computer networking and computer security. Existing computer lab classrooms are geared toward programming courses and are not easily reconfigured for courses needing isolation from the internet or the school network. The construction of a new computer science academic structure with computer lab learning environments isolated from the internet or the local school network can serve multiple functions, such as teaching fundamentals of cybersecurity in a sandbox environment, and to give students practice with network and switch configuration in preparation for future credential exams. The proposed new computer science academic building would include a dedicated Cybersecurity Lab, with equipment for 1 instructor workstation and 20 student workstations and software and hardware to create an isolated network suitable for cybersecurity courses, training, and simulation exercises. Another computer lab environment would be dedicated to courses requiring hands-on experience with networking and IT fundamentals. The equipment for this proposed networking lab also includes additional hardware and training kits to give students and existing IT personnel hands-on practice that can lead to basic networking certifications, such as Cisco Certified Network Associate (CCN)

The current building housing the computer science program is in a metal warehouse and cannot support anticipated expansion of academic programs to support workforce development in the computer science and cyber security field. The UOG Master Plan proposes a new building for computer science, housed together with mathematics, as the two programs are complementary and are organizationally in the same unit. Housing Computer Science with Mathematics allows synergy between the two programs and with the proposed new master's program in Statistics and Data Science. Planned coursework in Machine Learning/AI will benefit Computer Science and the new master's program.

To[CM1] [LA2] meet existing classroom needs for math and computer science, as well as provide new and updated computer labs for cybersecurity, IT, and networking, we anticipate the following requirements:

- 2 computer lab classrooms, capacity 20-25 students, for lecture and/or lab instruction
- 2 standalone, off-network, lab classrooms, capacity 1Five-20 students, for cybersecurity and networking classes/hands-on training
- 1 large classroom or flexible space, capacity 50-60 students
- 5 lecture classrooms, capacity 2Five-30 students
- 1 conference room, capacity 2Five-30
- 1 cyber research and testing lab
- 1 online teaching/meeting room
- 1 administrative office suite
- 10-14 faculty offices
- 2 storage rooms
- 1 elevator
- Server/lab tech space

• Open areas for students

UOG anticipates recruiting 1Five-20 students per year into the Computer Science program at UOG. We also plan to expand the Computer Science coursework in emphasis areas of Cybersecurity, Database Design, and Web and App Design. An additional goal is to go beyond an emphasis area in Cybersecurity and develop sufficient coursework to offer a certificate or minor in Cybersecurity. A certificate/minor program in Cybersecurity would attract students who may not wish to pursue a bachelor's degree in computer science, such as working professionals, or students in other undergraduate major programs who wish to enhance their existing major with a minor in this area.

Goal 2. Objective 2.

Hiring of Senior Researcher to facilitate the UOG 2+2 Computer Science Program preparing graduates who will enter the workforce with hands-on skills and deeper foundational knowledge in Computer Science.

The UOG Computer Science Program is undergoing revision to update the curriculum and align with 2020 undergraduate curriculum guidelines for Computer Science. UOG entered a Memorandum of Understanding (MOU) with the Guam Community College (GCC) in 2019 to create a "2+2 program" for Computer Science. Under this MOU, students wishing to obtain a four-year Bachelor of Science degree would attend GCC for the first two years of the program, earning an Associate of Science in Computer Science, and then continue their studies for the last two years at UOG to complete their bachelor's degree. This leverages the broader selection of programming languages and hands-on computer networking and IT courses available at GCC, giving students more technical skills early in the program. Then, at UOG students undertake advanced coursework that provides more in-depth core areas and prepares them for careers requiring four-year degrees as well as graduate studies.

A full-time senior researcher (Master's or Ph.D level) is needed to teach the new or modified 300- and 400-level courses that require knowledge in core subject areas and of current best practices in the CS and IT industry. This researcher will also be tasked with gathering and analyzing data about the 2+2 program to assist with assessment of the program and its effectiveness at producing well-trained graduates ready to enter the workforce on Guam. Specific duties include:

- Teach two to three courses per semester based on candidate's experience and training, from a list of new/modified upper-level courses for the 2+2 program.
- Provide recommendations for revisions to syllabi and course content, as needed.
- Advise and mentor students, as needed, regarding courses, internship opportunities, research projects, careers, credentialing, graduate studies, etc.

• Coordinate with CS program coordinator and other key stakeholders to develop plan to assess the 2+2 program over the first three years.
• Gather and analyze data per the assessment plan. Summarize results for stakeholders and make recommendations for revisions to the program based on the data.
• Provide advice and expertise, as applicable, in other areas related to IT workforce development or to other goals in this proposal.

Goal 2. Objective 3.

Once UOG develops and implements a certificate/minor program in cyber security, the institution would become eligible for designation as an NSA Center of Academic Excellence in Cyber Defense. UOG plans to pursue this designation which would further enhance the program and the credentials earned by students/participants.

The addition of standalone, off-network labs for Cybersecurity and IT and Networking will allow for students to experience hands-on training in sandbox environments. These labs can also be used by IT personnel for training or preparation for certification exams.

Goal 3. Objective 1

Construct a 15,000 square foot, two-story Data Center/Office of Information Technology building on the campus of the University of Guam.[CM3]

• The current Computer Center, constructed in 1992, is the University's main data center for the campus. The UOG Computer Center lacks the efficiency and security of modern data centers. The Computer Center also provides limited computer lab resources to the campus.
• The new Data Center / Office of Information Technology Computer Center will provide a modern data center, main central campus technology support, and provide the main computer lab resources for UOG.
• The modern data center will be secure, robust, and scalable. It will be a data center that content providers, government agencies, and other entities with different security requirements can utilize to better the Internet experience for its Guam users and the Marianas region.

Goal 3. Objective 2.

Continuing education coursework and certifications for IT personnel to include, but not limited to:

1. ITIL v4 Foundation

2. Cybersecurity
3. CompTIA
4. AI
5. Coding and Development
6. Cisco Certified Network Associate
7. Certified Information Security Manager
8. Certified Information Systems Auditor

Organizational Capability

The grant will be managed by qualified professionals to implement project activities and to lead successful execution. Resumes are attached with brief professional overview as follows:
Mr. Vincent Dela Cruz, UOG CIO, will be the Principal Investigator, and will provide administration and financial oversight for the project. Dr. Leslie Aquino will serve as one of three Co-PIs. Dr. Aquino is currently an Associate Professor of Mathematics and Division Chair of Mathematics and Computer Science. She is also the Executive Director and PI for NASA Guam EPSCoR Research Infrastructure Development (RID) Program at the University of Guam.
Ms. Cathleen Moore-Linn is the Executive Director of the Research Corporation of the University of Guam with extensive experience in human resources and business office processes support for the conduct of research at the University of Guam. Ms. Moore-Linn led the organization's growth from one grant project in 2014 to about 160 projects in 2023.
Dr. Pamela Peralta is the Director of Contracts and Grants at the Office of Research and Sponsored Programs. She has a decade of federal grant experience in Micronesia with focus on grant administration, financial compliance, and performance management. Dr. Peralta also holds a certification in grants management program.

Project Schedule, Activities, and Milestones

The project proposes to commence on January 1, 2024[LA4] with anticipated completion date on June 30, 2028.
Calendar Year 2024– 2026

2nd Quarter 2024	**3rd Quarter 2024**	**4th Quarter 2024**
Announce job position for Computer Science Senior Researcher	Hire Senior Researcher	Senior Researcher teaches 300-400 level CS courses
Procure Network Equipment, fiber optics cabling, servers	Ongoing procurement of upgraded network	Finalize procurement and award of project[VC5]
Procure lab supplies	Ongoing procurement of lab supplies	Finalize procurement of lab supplies

Lock in IT courses at min. (6) classes	IT personnel register and enroll in courses	Completion of 1 course
	Issue RFP for A&E Services	Begin Design Process

1st Quarter 2025	**2nd Quarter 2025**	**3rd Quarter 2025**
Senior Researcher teaches 300-400 level CS courses, tweaks courses, mentors students, etc.	Senior Researcher teaches 300-400 level CS courses, tweaks courses, mentors students, etc.	Senior Researcher teaches 300-400 level CS courses, tweaks courses, mentors students, etc.
Installation of Network Equipment, fiber optic cabling, and server infrastructure	Installation of Network Equipment, fiber optic cabling, and server infrastructure	Installation of Network Equipment, fiber optic cabling, and server infrastructure
Installation of lab supplies	Final installation of lab supplies	Use of lab supplies for IT courses
Completion of 1 course	Completion of 1 course	Completion of 1 course
Design Complete	Issue Bid for Construction	Offer selected

4th Quarter 2025	**1st Quarter 2026**
Senior Researcher teaches 300-400 level CS courses, tweaks courses, mentors students, etc.	Senior Researcher teaches 300-400 level CS courses, tweaks courses, mentors students, etc.
Installation of Network Equipment, fiber optic cabling, and server infrastructure	Final installation of Network Equipment, fiber optic cabling, and server infrastructure
Use of lab supplies for computer courses	Use of lab supplies for computer courses
Completion of 1 course	Completion of 1 course
Construction begins	

The timeline above will be assessed quarterly, and adjustments made as required and presented to the Office of Infrastructure Policy for approval. If our proposal outline is accepted, we will further develop the timeline to align with the funding cycle.

Project Results and Evaluation

The PI and Co-PIs will evaluate project success and results based on the following planned data collection:

1. Increase broadband connectivity campus-wide and reach with other educational institutions and Government of Guam facilities
2. 2+2 CS Program course syllabi with modified curriculum from newly hired Senior Researcher
3. Copy of configuration of CS laboratory and training space with supply installation and application
4. Copy of Certificate of Completion and Certification of IT courses from IT personnel
5. Construction of the Computer Science, Cyber Security, and Mathematics Building and the Data Center/Office of Internet Technology.
6. Application submitted to NSA to obtain a NSA CAE in Cyber Defense designation.

As each quarter is completed during the performance period, the PI and Co-PIs will measure project deliverables using quantitative data collection and qualitative assessment tools based on focus groups and interviews with students, staff, faculty, and UOG personnel. This information will be shared with the Office of Infrastructure Policy and OTECH. At the conclusion of grant performance, data collected will be shared with UOG administrators and other stakeholders to improve future digital expansion and technology enhancement benefiting students, campus personnel, and the wider community.

Attachments

1. Executive Summary
2. Institutional Capability

Resumes for Vincent Dela Cruz, Dr. Leslie Aquino, Ms. Cathleen Moore-Linn, and Dr. Pamela Peralta

3. Letters of Support

Letter from UOG President Dr. Anita Enriquez,

4. IDC Rate Agreement

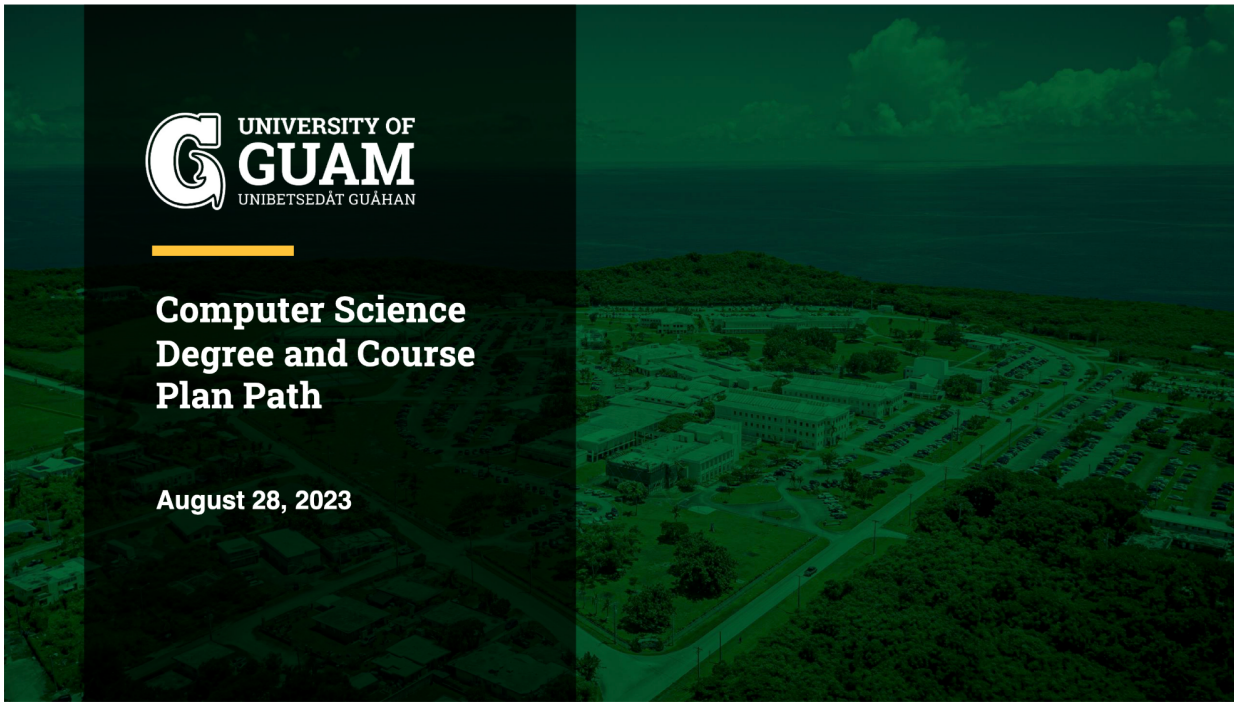
Advancing Digital Equity of Guam

University of Guam Budget Breakdown

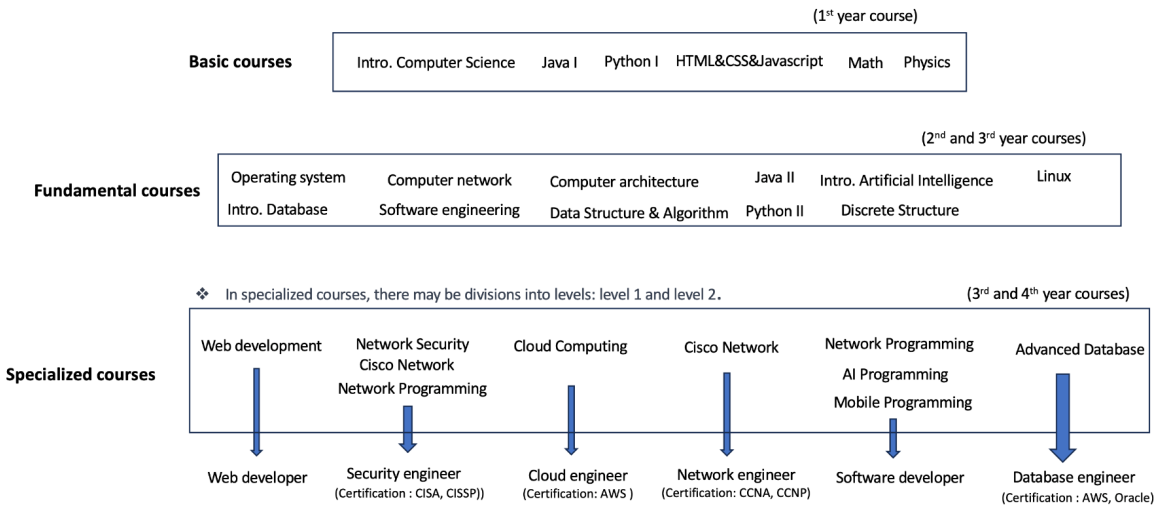
CATEGORIES	Year 1	Year 2	TOTAL
A. PERSONNEL	**Annual**	**Annual**	**Cost**
Vincet Dela Cruz - PI	**$20,000.00**	**$20,000.00**	**$40,000.00**
Leslie Aquino - CO-PI	**$20,000.00**	**$20,000.00**	**$40,000.00**
Computer Science Senior Researcher (FT)	$97,798.00	$97,798.00	$195,596.00
Accounting Analyst I (FT)	$37,918.40	$39,055.95	$76,974.35
Research Associate I (FT)	$37,918.40	$39,055.95	$76,974.35
Sub-Total	**$213,634.80**	**$215,909.90**	**$429,554.70**
B. FRINGE BENEFITS		**Rate**	**Cost**
Vincet Dela Cruz - PI	$1,530.00	**$1,530.00**	**$3,060.00**
	$1,530.00	**$1,530.00**	**$3,060.00**
Computer Science Senior Researcher (FT)	$19,560.00	$19,560.00	$39,120.00
Accounting Analyst I (FT)	$7,584.00	$7,811.00	$15,395.00
Research Associate I (FT)	$7,584.00	$7,811.00	$15,395.00
Sub-Total	**$37,788.00**	**$38,242.00**	**$76,030.00**
C. TRAVEL			**Cost**
None	$-	$-	$0.00
Sub-Total	$-	$-	**$0.00**
D. EQUIPMENT (>$5,000/unit)			**Cost**
VoIP	$303,752.00	$-	$303,752.00
Computers for lab workstations	$250,000.00		$250,000.00
	$553,752.00	**$-**	**$553,752.00**
E. SUPPLIES/SMALL EQUIPMENT (<$5,000)			**Cost**
Supplies for student lab workstations	$78,537.00	$-	$78,537.00
Sub-Total	**$78,537.00**	**$-**	**$78,537.00**
F. CONTRACTUAL			**Cost**
IT courses and certifications (~6 courses @ $1K/course for 30 IT personnel)	$90,000.00	$90,000.00	$180,000.00
			$0.00

Sub-Total	**$90,000.00**	**$90,000.00**	**$180,000.00**
G. CONSTRUCTION			**Cost**
Data Center/ OIT Bldg	$1,000,000.00	$14,000,000.00	$15,000,000.00
Computer Science/Mathematics Bldg.	$1,000,000.00	$9,000,000.00	$10,000,000.00
Sub-Total	$2,000,000.00	$23,000,000.00	**$25,000,000.00**
H. OTHER			**Cost**
None	$-	$-	$0.00
			$0.00
Sub-Total	$-	$-	**$25,000,000.00**
I. DIRECT COSTS	**$973,711.80**	**$23,344,151.90**	**$26,317,873.70**
K. OVERALL TOTAL	=		

RTLG suggests bigger than 10,000 sq ft [CM1]
agreed...maybe 12,000 sf [LA2]
We need to include GovGuam data center information in this section. [CM3]
I'm just estimating start and completion dates; please update as needed [LA4] [LA4]
I'm not sure where this falls, but I see this in 2022?? I've updated language to reference increased bandwidth and upgraded equipment [VC5]



UOG Computer Science Course Path Plan



UOG Computer Science Student Course Path.

Web Developer : Basic Courses → Fundamental Courses → Web development

Security Engineer: Basic Courses → Fundamental Courses → Cisco Network → Network Security → Network Programming

Cloud Engineer: Basic Courses → Fundamental Courses → Cloud Computing

Network Engineer: Basic Courses → Fundamental Courses → Cisco Network

Software Developer: Basic Courses → Fundamental Courses → Network Programming → AI Programming → Mobile Programming

Database Engineer: Basic Courses → Fundamental courses → Advanced Database

Short Career Training Course.

Web Developer : HTML&CSS&JavaScript → Intro.Database → Web development.

Security Engineer: Computer network → Cisco Network → Network Security

Cloud Engineer: Cloud Computing

Network Engineer: Computer network → Cisco Network

Software Developer: Java I, Java II → Python I, II → Network Programming (Network Software Developer)
Java I, Java II → Python I, II → AI Programming (AI Software Developer)
Java I, Java II → Python I, II → Mobile Programming (Mobile software Developer)

Database Engineer: Intro. Database → Advanced Database.

8. Endorsements

"The Office of Infrastructure Policy and Development's Five-Year Action Plan for the Guam Broadband Initiative, under the Broadband, Equity, Access, and Deployment grant Program, is a vital initiative for the island's economic prosperity and future growth, as it not only addresses internet latency, affordability, and accessibility but also lays the foundation for Guam's digital transformation, ensuring our island remains competitive and resilient in the global economy."

- Gov. Lou Leon Guerrero, Governor of Guam

"On behalf of the University of Guam, I endorse the Guam Broadband Infrastructure 5-Year Action Plan. The University of Guam is committed to working with the Guam Economic Development Authority, the Office of Infrastructure Policy and Development, and local government agencies and educational institutions to develop the workforce required to support this significant investment in Guam's broadband infrastructure."

- Dr. Anita Borja Enriquez, President, University of Guam

"The Bureau of Women's Affairs fully supports the Guam Broadband Infrastructure Five-Year Action Plan. This plan's focus on bringing broadband connectivity to all sectors of the island - especially to the economically disadvantaged - will help to bridge a major gap through the opportunities we create for people when we provide them with connectivity. Opportunities for improved access to education, to needed resources, and to more secure ways of keeping connected to each other. This plan will literally open up a whole new world to so many of our people."

- Jayne Flores, Executive Director Bureau of Women's Affairs

"In today's fast-changing digital world, having access to the internet and better connectivity is a game-changer. It's not just about technology; it's about helping those who are struggling the most. By making sure everyone can get online, we're supporting the fight against homelessness and poverty. This is why we're backing the BEAD Five-Year Plan - because it's a step towards giving everyone a chance to break the cycle of poverty and build a better future."

- Rob San Agustin, Director Office of Homelessness Assistance and Poverty Prevention (OHAPP)