

Fiber Optics Feasibility Assessment: Western Area Power Administration and Southwestern Power Administration



U.S. DEPARTMENT OF
ENERGY | OFFICE OF
ELECTRICITY



**Western Area
Power Administration**

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1 Executive Summary

The American Broadband Initiative (ABI) is the Administration’s signature strategy aimed at stimulating increased private investment in broadband infrastructure and services in order to address broadband connectivity gaps in America, particularly those in rural areas. Under ABI, there is recognition that federally-owned assets such as tower facilities, buildings, and land could potentially be made available to lower the cost of broadband buildouts and encourage private-sector companies to expand telecommunications infrastructure. To this end, to identify the types of Federal assets or classes of assets that private-sector companies could use to expand broadband infrastructure in America, the Western Area Power Administration (WAPA) and Southwestern Power Administration (SWPA), in consultation with the Department of Energy’s (DOE) Office of Electricity (OE), were asked to complete feasibility assessments to determine if WAPA and SWPA’s preexisting “excess fiber,” referred to as “dark fiber,” can be leased to their existing customers and broadband service providers.

Given the degree of variance among the assessments themselves,¹ and WAPA and SWPA’s differing legal authorities and obligations, geographic location, and current business practices, readers of this report are cautioned against applying these findings uniformly between each other.

WAPA and SWPA reached different conclusions in their individual assessments. For instance, WAPA stated that, contingent upon full clarification of their existing legal authorities, current law may potentially allow preference power customers to lease available fiber capacity in order to carry broadband internet traffic.² WAPA’s preference power customers pay back capitalized costs including those associated with fiber through the collection of revenues from these ratepayers, and it is possible they may have preference in the commercial use of the fiber under current law. Following clarification, and/or confirmation of additional legal authorities, WAPA also could potentially lease fiber to commercial broadband providers, which would require significant investment in managing and tracking leased fiber, as well as consideration for capital investment recovery, which in either case must be borne by the lessee. SWPA allowed for the possibility of leasing more than 100 miles of existing and available fiber capacity once various risk factors have been mitigated.

WAPA and SWPA further identified a number of risks associated with leasing available fiber capacity, including possible limitations on existing legal authority, right-of-way issues, cost, non-alignment with their Power Marketing Administration’s (PMA) missions,³ security concerns; and lack of benefit to utility operations, or potential interference with those operations. Ultimately, WAPA and SWPA concluded that it may be feasible to use their owned fiber in order to deliver broadband internet service to rural America in a manner consistent with the American Broadband Initiative.

¹ While SWPA and WAPA both conducted fiber assessments, they took different approaches. SWPA identified preexisting available fiber capacity on its system and conducted a technical analysis for the feasibility of leasing that specific fiber. In contrast, WAPA assessed the feasibility of leasing fiber in the abstract (and more qualitatively).

² Note, Sec. 9(c) of the Reclamation Project Act of 1939 requires that WAPA give preference to certain types of organizations seeking to purchase Federal power or lease power privileges. Those entities entitled to preference include cities and towns, state and federal agencies, irrigation districts, public utility districts and rural electric cooperatives. WAPA’s current policy also gives preference to Native American tribes regardless of whether they have utility status. Subject to clarification of the law, if WAPA were to allow the lease of available fiber capacity in order to carry broadband internet traffic, it may be required under current law to allocate it with preference given to its electric utility partners first.

³ PMAs market electric power and energy generated by the Federal water projects, while encouraging widespread use of the power at the lowest possible cost to consumers.

Note, that in the context of this report, the term “third-party” means any entity using fiber for non-electric utility purposes, and thus encompasses the leasing of available fiber capacity for the provisioning of broadband internet services.

2 Background

2.1 The PMAs

The Power Marketing Administrations are agencies that market the hydropower from Federal water projects. Congress transferred the Bonneville Power Administration (BPA), Southeastern Power Administration (SEPA), and Southwestern Power Administration (SWPA) under the oversight of the newly created Secretary of Energy through Sec. 302 of the Department of Energy Organization Act in 1977 (DOE Org. Act).⁴ The DOE Org. Act also created the Western Area Power Administration (WAPA). These sub-cabinet entities, WAPA included, were then established within the Department of Energy as separate and distinct Federal entities, each with their own existing authorities and performing within their specific regions.

Pursuant to the DOE Org. Act, the responsibilities of the U.S. Department of the Interior's Bureau of Reclamation (DOI) and U.S. Army Corps of Engineers (USACE), as they pertain to power marketing, including the construction, operation, and maintenance of transmission lines, were transferred to the PMAs. Note that the construction, maintenance, and operation of dams and power plants still falls under DOI and USACE.

In total, the four Federal PMAs – BPA, WAPA, SEPA, and SWPA – market and deliver wholesale Federal hydropower to 34 states. The PMAs operate and maintain over 34,000 miles of high-voltage transmission line, which are used to deliver power from water projects and the related hydropower generating facilities owned by DOI, the USACE, and the International Boundary and Water Commission. In 2012 the PMAs marketed 42 percent of the Nation's hydropower, representing 7 percent of the total generation in the United States.⁵ By law, the PMAs are required to set rates to cover costs, including the federal capital investment allocated to power, "at the lowest possible rates to consumers consistent with sound business principles."⁶

The PMAs sell wholesale hydroelectric power to wholesale preference customers, who in turn distribute hydropower to tens of millions of Americans. Classifications of wholesale customers include:

1. Federal and state agencies;
2. irrigation districts;
3. municipal, rural, and industrial users;
4. Native American tribes;
5. public utility districts;
6. rural electric cooperatives;
7. investor-owned utilities;
8. DOE National Laboratories; and
9. military bases

As stated above, the PMAs set rates at the lowest possible level that would cover all costs associated with power delivery. These recovered costs include: 1) annual operating costs, 2) specific allocated

⁴ 42 U.S.C. § 7152.

⁵ U.S. Energy Information Administration, "Federal Power Marketing Administrations operate across much of the United States," June 12, 2012, available at <https://www.eia.gov/todayinenergy/detail.php?id=11651>.

⁶ 16 U.S.C. § 825s.

multipurpose costs associated with recovering the Federal investment in generation facilities, and 3) other repayment costs.

2.2 Fiber Optic Cable

WAPA and SWPA currently have over 5,000 miles of fiber deployed among their transmission lines, the majority of which is optical ground wire (OPGW). OPGW is the preferred type of fiber for overhead transmission lines as it is both strong and versatile; it combines the functions of grounding, a telecommunications pathway, and lightning protection all in one single package. Typically, OPGW contains glass optical fibers inside a metal tube structure that is then surrounded by layers of high-strength steel and aluminum wire.

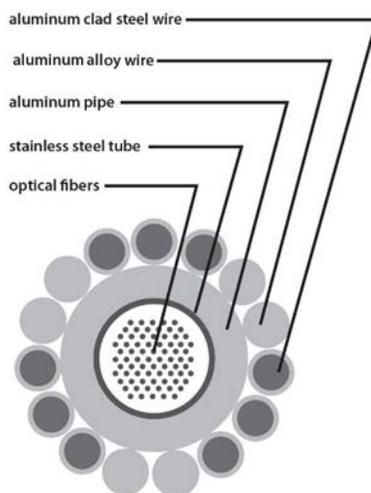


Figure 1: OPGW Cross-Section

Optical ground wire also has advantages over buried fiber optic cable, such as the installation cost per kilometer, and there being little to no risk of damage to the line during other maintenance and construction projects (e.g., excavation work or installation of buried pipelines). Additionally, as the overall dimensions and weight of OPGW are similar to that of traditional grounding wire, the transmission towers on which it is installed do not experience extra loading during wind and ice loads.

3 Leasing of Available Fiber Capacity

There are three primary approaches that communications service providers use to lease fiber assets: 1) leasing available fiber capacity, 2) acting as a wavelength service provider,⁷ and 3) offering a bandwidth service.⁸ It is the leasing of available fiber capacity that WAPA and SWPA have assessed under the ABI. While SWPA noted that, should it enter into the communications business, a wavelength service would offer the best combination of monitoring and flexibility for re-routing service in order to support power system operations while simultaneously providing broadband services, this approach is

⁷ For wavelength service, the provider would provide and maintain equipment that assigns each customer circuit a specific frequency (color of light) on the electromagnetic spectrum, which are then all combined on the fiber strands and split back out on the other end of the circuit. Here, the customer is designated a specific medium.

⁸ A bandwidth service is one where a customer pays to access a specific portion of a specific communication channel relative to the channel's maximum data transfer rate; whereas in a wavelength service the customer is provided a dedicated medium, bandwidth customers are multiplexed onto the same specific bandwidth. For example, a customer who purchases 250 Mbps on a 1 GB connection would be allocated 25% of the channel's overall bandwidth.

beyond the scope of ABI's Workstream Action Plan, which requires explicitly that WAPA and SWPA, in consultation with OE, "assess [the] viability of leasing DOE dark fiber."⁹

Fiber is generally identified in pairs, where two fiber strands work together as a "send" and "receive" telecommunications path – available fiber capacity (or sometimes referred to loosely as "dark fiber") refers to unlit or unused fiber within an OPGW line, and in this case that neither WAPA nor SWPA expects to use in the near future. A fiber provider, the lessor, is the entity that sells direct access to the unused fiber optic strands in its fiber optic cables. The customer who leases these strands (lessee) is responsible for purchasing and maintaining their own communications electronics that connect to this fiber. It is typical for the provider and customer to sign an indefeasible right of use (IRU), which allows the customer full use of the identified fiber strands. IRUs are most often long-term contracts, with 20-year timeframes being the norm. Unlike an IRU, the terms of any lease agreement to execute leasing of federally-owned available fiber capacity would likely be tailored for federal purposes and not indefeasible.

Generally, the leasing of fiber is a relatively simple business to enter in that it only involves the selling of rights to preexisting unused and available fiber capacity, though as discussed below, fiber leasing is not as straightforward for WAPA and SWPA. In order to provide this service, fiber is built off from a customer's preexisting infrastructure and then spliced into the provider's fiber, at the customer's expense. Note, here the term "customer" refers to the entity leasing fiber from the provider and it is not to be confused with customers in the sense of those who purchase broadband service. As WAPA and SWPA do not act as distribution utilities, it would be the responsibility of the customer to find a path to the splice location. After the initial infrastructure construction phase, interaction between the customer and the provider is infrequent, typically only occurring when the provider's fiber is broken and requires repair. The costs associated with repairs are required in advance; lease payments are usually either paid in a single lump-sum at the beginning of the contract, or on an annual basis.

Under a fiber leasing program, WAPA and SWPA, as providers, would not need to provide and maintain additional electronics (as it pertains to providing broadband service) since any equipment connected to the fiber would be owned and maintained by the customer. However, the absence of provider-owned electronics on the fiber makes the line more difficult to monitor, typically resulting in higher impact outages, which are also harder to troubleshoot. While there are options for mitigating these issues, they come with their own sets of challenges that must then be addressed. Potential customers wishing to interconnect (via splicing) with WAPA and SWPA's fiber must consider how closely the fiber meets industry standards and whether it is aligned for their intended application. These considerations include glass characteristics, cable specifications, suitability for dense wavelength multiplexing (DWDM) equipment, and the age of the cable.

For longer fiber spans, the electronics used to light the fiber are typically installed at a predetermined distance/location; it is typical for the provider to provide the customer with a lockable cabinet in which to store their equipment if the customer is leasing space in the provider's preexisting fiber regeneration huts. However, as the customer's equipment is often remotely monitored, WAPA and SWPA would be required to divert attention away from electric utility tasks in order to provide customers with, should they require it, physical access to their equipment. While the provider could require the customer to install their own facilities on an intermediate splice point, this will likely discourage some from leasing

⁹ American Broadband Initiative, *Milestones Report: February 2019*, p. 22, available at https://www.ntia.doc.gov/files/ntia/publications/american_broadband_initiative_milestones_report.pdf.

the fiber in the first place. Similarly, WAPA and SWPA, as providers, would be required to send technicians to the demarcation point on the line after customers report issues, unless it can be proven beforehand that the provider is not at fault – this too would draw staff away from other tasks.

WAPA identified a number of security concerns with allowing third-party access to WAPA-owned facilities, as such:

1. WAPA would need to construct, at the expense of the third party, fiber interface locations at the edge of their property. This construction would generally include a pedestal on the property line, buried cable into the main WAPA facility, and patch panels at each end. Third-party fiber would connect to the WAPA fiber at the abovementioned pedestal.
2. Documentation of fiber cable routes, usage, and splice and patch panel locations would become critical for third-party usage, the existence of and access to this information could also raise its own set of security concerns.
3. In instances where WAPA OPGW terminates in a non-WAPA-owned facility, third-party access to that facility would require additional engineering, maintenance, and agreements with the facility owner (assuming the owner agreed to participate in the arrangement). As is the case with OPGW terminating in WAPA facilities, these costs would be the responsibility of the third party.

3.1.1 Current Available Fiber Capacity

The availability of fiber capacity varies between WAPA and SWPA, and takes into account: 1) existing use for operations and system protection, 2) utility partner needs, and 3) reserves for future needs. Currently, and regarding both the sharing of existing fiber routes and the building of new fiber routes such that one entity owns the route and the other has exclusive rights to a certain number of fibers along the route, WAPA and SWPA typically partner with other electric utilities.

Overall, WAPA and SWPA had identified varying numbers of available excess strands located throughout their systems that, when aggregated, total more than 5,000 miles in federally-owned available fiber capacity.¹⁰

It must be noted that the term “excess” should not be taken to mean more than necessary or extra, and should instead be interpreted as additional potential capacity. Taken alone, the term excess may suggest to some that WAPA and SWPA overbuilt their fiber systems beyond that which was/is necessary. In reality, this additional potential capacity (“excess”) has or will eventually be paid for (through rates) by WAPA and SWPA’s preference customers. Similarly, that this “excess” is currently dark for WAPA and SWPA’s electric utility purposes does not guarantee that it will remain so.

4 Legal Authority

Section 10 of the Reclamation Act of 1939 authorized the Secretary of the Interior to, at their discretion:

1. “Grant leases and licenses for periods not to exceed fifty years, and easements or rights-of-way with or without limitation as to the period of time affecting lands or interest in lands withdrawn or acquired and being administered under the Federal reclamation laws in connection with the construction or operation and maintenance of any project . . . Such permits or grants shall be made only when, in the judgment of the Secretary, their exercise will not be incompatible with

¹⁰ In the case of SWPA, 100 miles of available fiber identified has been determined to be marketable.

the purposes for which the lands or interests in lands are being administered, and shall be on such terms and conditions as in his judgment will adequately protect the interests of the United States and the project for which said lands or interests in lands are being administered.”¹¹

Section 5 of the Flood Control Act of 1944 further authorized the Secretary of the Interior to:

1. “Transmit and dispose of such power and energy in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles, the rate schedules to become effective upon confirmation and approval....;”¹²
2. and “from funds to be appropriated by the Congress, to construct or acquire, by purchase or other agreement, only such transmission lines and related facilities as may be necessary in order to make the power and energy generated at said projects available in wholesale quantities for sale on fair and reasonable terms and conditions to facilities owned by the Federal Government, public bodies, cooperatives, and privately owned companies.”¹³

Though the above acts originally granted authorities to DOI, the DOE Organization Act transferred all functions with respect to the PMAs to the Secretary of Energy. This transfer included “the power marketing functions of the Bureau of Reclamation [a DOI bureau]..., including construction, operation, and maintenance of transmission lines and attendant facilities.”¹⁴ The DOE Organization Act also authorized the Secretary of Energy to enter into and perform “such contracts, leases, cooperative agreements or other similar transactions with public agencies and private organizations and persons, and to make such payments...as he may deem to be necessary or appropriate to carry out functions now or hereafter vested in the Secretary.”¹⁵ Note, DOE believes that those authorities provided for above are sufficient to allow the Secretary of Energy, or his delegates, to set rates for use of WAPA’s or SWPA’s fiber.

WAPA and SWPA may rely on the statutory authority to construct, maintain, operate, and share fiber optic cable to perform DOE’s power marketing functions relating to electric power. New authority may be needed, but it may be possible the above statutory authority could allow the use of fiber optic assets for third-party communications unrelated to the operational requirements associated with the marketing and transmitting of electric power if the third party lights the fiber. Alternatively, it may also be possible that WAPA and SWPA could allow the use of fiber optic assets for third-party communications in the same manner it would allow the use of personal and real property assets without having a nexus to operational needs. Note that these authorities would need to be considered on a case-by-case basis in order to assess whether they are adequate for a specific project. In addition, if WAPA and SWPA begin leasing available fiber capacity to third parties, all receipts from such agreements would have to be returned to the Treasury since under the Miscellaneous Receipts Act¹⁶, a PMA is required to deposit any receipts with the Treasury, unless there is a specific statutory authority to retain the funds.

¹¹ 43 U.S.C. § 387.

¹² 16 U.S.C. § 825s.

¹³ Ibid.

¹⁴ 42 U.S.C. § 7152(a).

¹⁵ 42 U.S.C. § 7256(a).

¹⁶ 31 U.S.C. § 3302(b).

5 Issues Pertaining to Land

5.1 Land Use Agreements

WAPA and SWPA do not currently have the explicit legal right to deliver commercial communications services over their existing infrastructure placed on private property, and in order to achieve this, land agreements would have to be modified. These modifications will require coordination between the lessee, landowners, and the relevant records office. The following documents, which SWPA reviewed in relation to its existing land agreements are explicitly for “the erection, operation, and maintenance of a line or lines of poles, towers, or other structures, wires, cables, and fixtures for the transmission of electric current,” *and do not address communication services in the list of rights obtained:*

1. Perpetual Easements for Transmission Line Purposes
2. Corps of Engineers Permits
3. Corps of Engineers Joint Use Agreements
4. General Services Administration Agreements
5. Judgments Upon Declaration of Taking

5.2 Land Rights

Land use agreements such as right-of-way agreements and easements contain varying language, ranging from the right to “construct, operate, and maintain” an electric transmission line, to language including the right to “attach appurtenances for communication purposes.” While SWPA had determined that its land rights typically included the right to install fiber optics to support its transmission operations, the analysis did not state whether its fiber rights extended to applications such as the leasing of available fiber capacity for broadband delivery.

WAPA identified land rights as a potential risk for third-party fiber use, especially as it pertains to commercial broadband applications-both PMA assessments casted doubt as to whether current land use/right agreements allow for third-party use for commercial broadband purposes.

Similarly, the two PMAs raised concerns that if they allow for the use of the fiber under existing right-of-way agreements, to include leasing to third-parties, there exists the possibility the PMAs could be challenged for using fiber for non-electrical purposes beyond the scope of easements. WAPA and SWPA also concluded that it is “highly likely” that they would need to amend their existing land use agreements or require third-party users to obtain their own land rights directly from the landowner-in either scenario the third party would likely be required to pay rent.

5.2.1 Federal Rights-of-Way

For use of WAPA- or SWPA-owned fiber on Federal lands for broadband delivery, the third party would have to obtain its own land rights, which would likely include an annual rental fee. In regards to fiber crossing tribal lands, the PMAs’ recent experiences have shown that obtaining permission from tribes and the Bureau of Indian Affairs could be challenging, time consuming, and costly to the third party.

5.2.2 Private Rights-of-Way

There are generally three options for fiber use on private lands:

1. Allow the use and require that the third party accept all costs, risks, and responsibility for WAPA or SWPA land rights, or

2. Prior to allowing use, require that third parties obtain their own land rights in order to use the fiber. WAPA and SWPA would specify in their agreements that they are not giving any right and title to the easements, and that the third-party needs to obtain them (the land rights) directly from the land owner, or
3. WAPA or SWPA modifies its land use agreement to permit third-party use.

Each of these options has its own set of issues that must be considered.

5.2.2.1 Potential Issues to Consider Related to Option 1

1. WAPA or SWPA may need to require that third parties carry and provide evidence of general liability insurance or post sufficient escrow.
2. If the third party is challenged and does not have adequate funds, WAPA or SWPA would need to ensure that this cost does not fall on its customers--it is uncertain as to how this can be accomplished.
3. WAPA or SWPA may still ultimately be liable for this cost, whatever it may be.

5.2.2.2 Potential Issues to Consider Related to Option 2

The two PMAs' relationships with landowners may be jeopardized or otherwise affected by third-party contact with landowners.

5.2.2.3 Potential Issues to Consider Related to Option 3

1. May require a new right-of-way acquisition project, which would require significant work.
 - a. Would require additional staffing and resources.
2. It is uncertain as to whether WAPA or SWPA would be able to get landowners to agree to new land rights.
3. Should landowners not agree with the modified land rights, it is uncertain if WAPA or SWPA could or would condemn the property needed for third-party use, for non-power use.
 - a. Need to research the use of condemnation authority in other agencies.
4. The risks, both real and perceived, of WAPA or SWPA using eminent domain authority for non-power purposes are unknown.

6 Financial Matters

6.1.1 Estimated Project Costs

Under current law, and absent specific statutory authority to retain funds, under the Miscellaneous Receipts Act,¹⁷ both WAPA and SWPA are required to deposit any receipts with the Treasury such as those revenues associated with third-party fiber leasing. While not based on its statutory authority to set power rates, of which there is no process for fiber, WAPA stated that any infrastructure additions necessary for providing third parties access to their existing available fiber capacity for commercial broadband should be funded by third-parties. WAPA and SWPA's preference power customers shall not bear the cost of providing access to those third-parties. Financial mechanisms shall be put in place to fully segregate the funding and revenue streams for each purpose (i.e., power vs. broadband).

In order to ensure that any potential third-party customer is financially sound, all new fiber contracts must fall under WAPA and SWPA's creditworthiness programs.

¹⁷ 31 U.S.C § 3302(b)

6.1.2 Cost Analysis

An analysis of estimated costs associated with construction, easement, and operations was also conducted by SWPA, which is covered below.¹⁸ Note that SWPA made explicit that in order to be feasible, any additional costs of leasing SWPA available fiber capacity should not increase overall costs to it without an equivalent amount of revenue generated from fiber leases.

6.1.2.1 Construction

SWPA estimates that they would incur engineering, material, and construction costs for each instance in which a fiber lessee needs to access fiber in the existing OPGW cable. Further, while the lessee would be responsible for extending a new access cable from their system to SWPA's fiber, SWPA would be responsible for the completion of construction past the demarcation point on the line. Based on the assessed lowest impact access method, which requires the lessee to tap into existing OPGW splices, SWPA estimated fiber access construction costs to be \$35,405 per instance, assuming a 30 percent adder for general and administrative (G&A) costs. Note that these figures are in reference to the leasing of specific existing SWPA fiber and should not be extrapolated to WAPA or other potential fiber activities conducted by SWPA. The above construction costs for fiber access should be collected from the lessee upfront and should be separate from the lease payment. See Appendix I for a breakdown of these costs.

6.1.2.2 Easement Costs

SWPA also estimated that it would cost \$5,025 per parcel in order to modify easements to include communications on transmission OPGW, to include fees for:

1. Legal (\$2,000)
 - a. Legal guidance, easement amendment and other documents.
2. Title (\$500)
 - a. Update current ownership.
3. Negotiation (\$500)
 - a. Amendment to easement.
4. Right-of-way (\$2,000)
 - a. Agent costs including per diem, travel, computer, and cell phone charge.
5. Recording (\$25)
 - a. Fees vary by county, but average \$25 per document.

6.1.2.3 Operational Costs

Upon the installation of the first leased fiber circuit, SWPA may be required to hire or contract labor to support the ongoing maintenance of the leased fiber circuit such as through responding to customer calls, troubleshooting the outage, and performing restoration services.

7 Other Considerations

¹⁸ Note that the applicability of these figures is representative only of the costs associated with the scope of SWPA's analysis, as such these figures should not be interpreted as inclusive of all such projects.

7.1 Environmental and Cultural Issues

The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C 4321 et seq., requires Federal agencies to consider the potential environmental impacts of proposed actions as part of agencies' decision-making processes.¹⁹ Fiber projects undertaken by WAPA and SWPA would be assessed on a case-by-case basis in order to determine the appropriate level of NEPA review. In some cases, projects may be eligible for a categorical exclusion, thereby complying with NEPA without having to conduct either an Environmental Assessment or an Environmental Impact Statement for the project. Similarly, projects may be subject to both Federal and state laws that seek to protect cultural lands or sites.

7.2 Maintaining Security and Compliance

WAPA and SWPA's utility partners utilizing fiber are likely already familiar with North American Reliability Corporation (NERC) standards and requirements, such as the critical infrastructure protection (CIP) standards. However, lease agreements with other third-parties, such as commercial broadband providers, warrant special attention in regards to compliance requirements given their likely unfamiliarity with them. Other such considerations include site physical security and the protection of Official-Use-Only-designated information.

7.2.1 Physical Security

Third-party lessees would need to satisfy WAPA and SWPA's (and others') security requirements. Such requirements may include restricting access to fiber access points within federally-owned electrical facilities, prohibiting access during certain periods, and coordination and escort for entering a facility. In order to facilitate these requirements, lessees may be required to provide employee data (e.g., name and citizenship) before receiving permission to enter facilities. Similarly, lessee personnel who fail to meet security requirements may be prohibited from accessing these facilities.

Lessees would be able to avoid these concerns through the establishment of their own point-of-presence off WAPA or SWPA property for fiber interfaces and equipment, as this would eliminate the need for third-party CIP training and access to PMA facilities. However this solution comes with its own set of considerations, such as increased PMA design time, land use agreements, and additional infrastructure.

7.3 Staffing

WAPA noted that it has currently utilized fiber partnerships for telecommunications that support transmission operations. These existing partnerships' related business practices are tailored specifically for the power business, and thus do not impact WAPA's current staffing requirements. However, should fiber leasing practices be expanded to non-electrical purposes, increased staffing would be required for program management, legal matters, contracts, land issues, environmental issues, finance, geographic information system (GIS) tracking, maintenance and outage coordination, and documentation requirements. Existing staffing is not sufficient to effectively address expanded use for non-electric purposes.

7.4 The GIS System

Currently, fiber inventory is only generally tracked, with specific fiber route details being kept only on a case-by-case basis, however WAPA and SWPA noted that in order to allow for effective situational awareness regarding third-party fiber use across their lines, tracking system capabilities would need to

¹⁹ See <https://www.epa.gov/nepa/what-national-environmental-policy-act>.

be advanced. A GIS-based fiber management system was suggested as it would: provide the PMAs with data on where third-party use exists, the fibers in use and information on related fiber agreements, and assist in making outage response and restoration more effective. While GIS systems are effective and (should third-party leasing go forward) necessary, they are also expensive. Discussions held by WAPA and SWPA with similar-sized utilities indicated that the costs associated with a GIS system would be substantial.

7.5 The Outage Process

The introduction of third-party fiber lessees for broadband purposes on WAPA and SWPA lines would necessitate additional planning, coordination, and more universal procedures for repairs during both outage conditions and routine maintenance. WAPA noted the following:

1. In order to increase efficiency of repairs and service availability, advanced capabilities regarding fiber condition, usage, spare parts inventories, coordination, and awareness must be developed. These issues also imply the need for additional staff, hardware, and software.
2. Given the necessity of internal situational awareness for their operations, WAPA's operation and maintenance personnel will need to develop additional customer usage tracking capabilities. This too would likely require additional hardware, software, and staffing, though the degree to which is dependent on the number of new customers and interface locations.
3. A detailed service-level agreement (SLA) must be included in the fiber agreement in order to facilitate the third-party's understanding of outage parameters and repair times before they are placed on WAPA fiber. The agreement must be explicit in stating that in the event of outages, power service restoration will *always* take priority over fiber restoration. Similarly, relevant details regarding the possible frequency and duration of outages should be provided to third-parties well in advance of negotiations over the SLA or the providing of fiber services.

7.6 Standardization of Customer Fiber Request Process

Should WAPA and SWPA move forward with leasing available fiber capacity to third parties in order to provide rural communities with better access to broadband services, they must develop processes and procedures at the PMA level that outline how requests would be made, what entities would be allowed access, and what uses would be allowed. WAPA noted that its current process for fiber usage requests is handled regionally and is based on best practices, though it noted that it plans to move to a PMA-wide process.

8 Input from Existing Customers

In acknowledgement of its existing preference power customers, WAPA provided a forum through which these preference power customers could ask questions, identify issues, and voice concerns with respect to the leasing of available fiber capacity.²⁰

Overall, customers were supportive of WAPA continuing its current fiber partnership practices, i.e., making dark fiber available to partners for electric utility use. Customers were also interested, though cautiously so, in exploring other fiber uses, such as making fiber available for the carrying of broadband internet traffic.

²⁰ WAPA does not necessarily agree with, nor endorse any of the interests and opportunities/challenges and concerns outlined in this section.

Below is a list of conclusions from the forum. Note that WAPA’s preference power customers expressed interests and opportunities/challenges and concerns that likely differ from those of the rural Americans who would benefit from fiber delivering broadband services and ABI.

Interests and Opportunities	Challenges and Concerns
Fiber partnerships were recognized as having the benefits of benefitting rural customers, augmenting revenues, and improving WAPA’s system resilience.	Cybersecurity and access to WAPA facilities was of critical concern.
The expansion of broadband was perceived positively by some as being very similar to last century’s efforts to electrify rural America.	WAPA must ensure that the beneficiary of fiber services is responsible for paying any related costs.
Fiber partnerships were also perceived as having the ability to improve critical services to communities such as: healthcare, communications for first responders, fire and safety management, wildfire protection, and seismic early warning systems.	Amending right-of-way easements would be expensive and could entail potential legal challenges. These challenges have been briefly discussed in the section titled Land Rights.
Fiber partnerships could address concerns regarding outages by adding redundancy and providing capabilities to re-route services.	WAPA must ensure that any new fiber partnerships do not impact its primary mission of delivering power.
Customers acknowledged that fiber partnerships can help to bring modern internet connectivity to rural America, which, given our modern internet-driven economy, is more crucial than ever before.	

9 Use by Commercial Broadband Providers and Electric Utility Partners

In its assessment, WAPA weighed the opportunities and risks associated with leasing available fiber capacity to commercial broadband providers and electric utility partners to carry broadband internet traffic. These considerations are summarized in the below table and echo many of the points previously addressed in this paper.

Opportunities	Risks
<ul style="list-style-type: none"> • If a partnership with a third-party could include the swapping of fiber routes, it may be possible to enhance WAPA’s telecom capabilities and save on the cost of installing such routes. • Allowing fiber use in unserved or underserved areas could bring benefits to communities throughout WAPA’s service area. • If a third party is currently providing leased services to WAPA, it may be possible to lower existing lease costs when exchanging fiber. 	<ul style="list-style-type: none"> • There would likely be considerable concern and possible negative reactions among preference power customers from leasing fiber to other electric utility partners and commercial broadband providers because they would interpret it as requiring them to subsidize third party fiber infrastructure. • Additional legislation may be required for WAPA to lease fiber for broadband delivery. • WAPA may receive (right-of-way) challenges for using fiber beyond the scope of it easements.

- WAPA may incur the cost of potential litigation and bear ultimate financial responsibility for funding and repayment of cost.
- Commercial Broadband Providers are likely unfamiliar with NERC/CIP standards.
- Commercial Broadband Providers may require access to sensitive technical data, including system drawings.
- The number of spare fibers available for repair, network expansion or growth, protection needs, and other operational needs could be reduced below operational reserves.
- Additional WAPA staff would be required to support management and maintenance of additional fiber infrastructure.
- Would require significant upgrades to WAPA’s fiber management system.
- WAPA would bear an increased burden regarding outage coordination.
- WAPA’s return to service priorities (power restoration) would likely compete with those of the broadband provider.
- Disparities between WAPA and SWPA’s maintenance capabilities, and timelines expected by broadband providers (and their customers) may result in unfavorable media attention for WAPA and SWPA, should there be a “delay” restoring a loss of fiber services.

10 Conclusion

In their analyses, WAPA and SWPA concluded that the abovementioned risks and limitations must first be addressed to feasibly lease “excess” fiber to third parties to assist in the delivery of broadband internet to rural America. Leasing federally-owned and available fiber capacity is consistent with the ABI, and would assist in speeding broadband deployment, and bringing faster, reliable internet to tens of millions of Americans currently without it.

Appendix I

Estimate of Fiber Access Construction Costs

Unit Category	Unit Description	Unit Cost		G&A 30%	Total Unit Cost	Qty.	Total	Notes	
Labor	Trenching (per foot)	\$2.00		\$0.60	\$2.60	400	\$1,040.00	200' per end	
Labor	Conduit install (per	\$8.00		\$2.40	\$10.40	400	\$4,160.00	Open trench	
Labor	Riser install (per foot)	\$4.00		\$1.20	\$5.20	50	\$260.00		
Labor	Pulling cable (per ft &	\$2.00		\$0.60	\$2.60	400	\$1,040.00	200' per end	
Labor	Splicing prep. (per	\$400.00		\$120.00	\$520.00	2	\$1,040.00	1 splice per end	
Labor	Splicing (per single splice)	\$100.00		\$30.00	\$130.00	4	\$520.00	2 strands	
Testing	Preparation (2 testers)	\$1,600.00		\$480.00	\$2,080.00	1	\$2,080.00		
Testing/Material	Equipment rental (1	\$5,500.00			\$5,500.00	1	\$5,500.00		
Testing	Tier 1 (power	\$2,200.00			\$2,200.00	1	\$2,200.00	Bi-directional	
Testing	Tier 2 (OTDR)	\$6,800.00			\$6,800.00	1	\$6,800.00	Bi-directional	
Testing	Analysis and reporting	\$4,400.00		\$1,320.00	\$5,720.00	1	\$5,720.00		
Material	4" Conduit (per foot)	\$3.00			\$3.00	400	\$1,200.00	200' per end	
Material	Fiber Optic Duct Cable	\$4.00			\$4.00	500	\$2,000		
Material	Misc. riser mounting	\$50.00			\$50.00	2	\$100.00	1 riser per end	
Material	Heat shrinks (package of	\$5.00			\$5.00	1	\$5.00		
Material	Splice tray	\$48.00			\$48.00	2	\$96.00		
Material	Slack loop storage	\$700.00			\$700.00	2	\$1,400.00		
Material	Grommets	\$50.00			\$50.00	2	\$100.00		
Material	Cleaners	\$72.00			\$72.00	2	\$144.00		
TOTAL								\$35,405.00	