Exhibit A

Statement of Work (SOW)
and
Maintenance Services

City of Flagstaff – Microwave Upgrade Project

Integrated IT Network

Project Proposal

Basis of this proposal

JC Cullen, Inc. dba Niles Radio Communications of Flagstaff, is proposing to the City of Flagstaff IT department, to upgrade their city Information Technology network, to a city owned and operated microwave network, utilizing to the greatest degree possible, and city owned facilities.

Currently, the City of Flagstaff IT, referred to as IT, for the remainder of this document, uses Suddenlink cable services to connect the city facilities of the public cable utility infrastructure and relay the IT traffic back to City Hall. This is a fee based service, that also has restrictions that limit the ability of the IT department to maintain or make changes to the network without 3rd party involvement, and limits the IT department's ability to perform basic QA analysis of the system operations or timely respond to issues affecting operation.

IT has added four microwave links to the system, replacing older equipment, provided by Niles Radio Communications. These links are licensed 18 GHz and 23 GHz microwave links, operating on frequencies that are licensed and coordinated to the City of Flagstaff. The first of these links was a path from City Hall, to Mt. Eldon, known as ME0, and then out to the Cinder Lakes Landfill facility. This link has performed with a 100% availability over the last 3 years of operation, at a bandwidth of 100Mbps, and is the basis of this proposal.

The contracted services provided by Suddenlink expire within the next calendar year, making this an ideal time to review a proposal to expand city owned infrastructure to the entire IT network.

Proposal Description

Niles Radio Communications proposes to provide a Microwave Network, selecting from a limited subset of manufacturers equipment, systems and solutions, to connect all of the IT departments facilities currently serviced with the Suddenlink services. The sites selected maintain the greatest degree of independence possible from using third party sites, minimize rental and monthly recurring expenses, and maintain a high degree of reliability expected for an enterprise solution.

This proposal is based fully on existing equipment and technologies in use by the IT department now.

Niles Radio proposes:

- Upgrade the City of Flagstaff tower located on McMillan Mesa (Located behind USGS and the Business Incubator / Business Accelerator facilities).
- Replace the existing 300Mbps Microwave Path from City Hall to Mt Eldon, with a 600Mbps expandable bandwidth system, using the McMillan Mesa Tower.
- Install a Network Relay location at the Law Enforcement Administrative Facility.
- Install a Network Relay location at the City of Flagstaff AquaPlex.
- Leverage the Lake Mary Water Treatment plant and Airport Terminal as a Relay location for Fire Stations 6 and Airport.
- Provide, if requested, for the City of Flagstaff IT use, 40 Mbps and up to 1Gbps, through the Mt Eldon network termination location.

- Configure Network Services to support 50Mbps configured access at each secondary location, and 100-150Mbps at each primary network location.
- Provide 600Mbps network bandwidth, expandable to 1.2Gbps.
- Provide for expandable routes that can have diversity paths and standby equipment added to improve the system network reliability and availability.
- Design the network for an anticipated < 99.999% system availability, or less than 315 seconds of anticipated outage time, distributed over a year.

Statement of Work

The statement of work progresses in three distinct phases:

Phase 1 – Network Path and System Engineering

Each of the microwave paths shown in this document, is a preliminary proposal, based on the request to service with network traffic, and an analysis of all paths and obstructions known at this time.

In Phase 1, Niles Radio will meet and discuss with Flagstaff IT, the exact needs for each location, and engineer a series of connected radio paths that meets the bandwidth, throughput, availability and management goals, for each path.
It is during this phase that the Radio Frequencies will be coordinated and licensed, or the RF environment will be analyzed for any unlicensed paths, to ensure that the designed path will support the required path.

Niles Radio will fully evaluate the tower upgrade requirements at McMillan Mesa, and obtain a soils analysis from the site, evaluate utilities locations, and evaluate FAA and FCC requirements for the site.
Niles Radio will also make all required notifications to entities such as Arizona State Historic Preservation Office, Tribal Entities, US Fish and Wildlife Service. This is known as the E-106 process.
Tower construction notification allows Niles Radio to submit notifications of proposed tower constructions to the FCC. The FCC provides this information to federally-recognized Indian Tribes, and State Historic Preservation Officers (SHPOs), and allows them to respond directly to us if they have concerns about a proposed construction.
The E-106 System enables the real-time referral of information and documented communication among all participating parties, including the FCC. Using the E-106 System, parties proposing to construct communications facilities electronically submit the FCC Form 620 or 621to the SHPO/THPOs using a secure website maintained by the FCC. This system also provides electronic notice of the filing to the relevant State Historic Preservation Officer (SHPO), federally recognized Indian Tribes, and other consulting parties, who will be able to access the filings pertinent to them using a secure password. SHPOs and consulting parties can also use the system to comment on filings and otherwise participate in the process, and to access each other's filings.
This process allows us to complete the required tower approval processes that are separate from the City of Flagstaff processes and procedures, in the least amount of time and without issues caused by miscommunication between entities.
During this process, the exact equipment list will be determined for each path, and a final system cost will be established, which is fully expected to fall well within the proposed budgetary amounts in this proposal.
Niles Radio will begin the process by creating a full project schedule that will be distributed to all parties, and provide a link to the Niles Radio Communications web-site

where the project process and progress can be tracked, and a group e-mail list that all parties to the project will remain in contact through.
This process is expected to take approximately 16-20 weeks.

Phase 2 – Equipment Acquisition and Site Preparation

During this phase, Niles Radio will order and acquire the required radio equipment, complete all site 'make-ready' work such as building or installing mounts at each of the sites, or installing mounting monopoles or other structures if required.
Niles Radio will also construct the MacMillan Mesa site during this phase.
All routing interconnections are installed, programmed and tested during this phase, as well as coordinating routing and VLAN issues with the Flagstaff IT department and Utilities department users.
This process is expected to take 12-16 weeks.

Phase 3 – Equipment Installation and Sites Activation

During this phase, Niles Radio will install each of the sites, complete the network drops for each, and build out the network.
Installing the primary microwave links, and establishing network connectivity is completed first, followed by installations at each of the remote sites and preparation for network cutover of each site by Flagstaff IT personnel.
Installation and completion of the Network is expected to take 12 weeks to complete.
The complete project process is expected to take 40 to 48 weeks to complete.

Proposed Budget

This budget presentation proposal is budgetary in nature. As the paths have been verified only by initial computer analysis, and basic physical examination, there is the possibility that some of the proposed paths will not be available for use, and that alternate routing will be required.
The path analysis for each path in this proposal, was created from a matrix of paths, from each endpoint, to every possible network location, looking for paths that result in the shortest path length, and connected to a facility that does not incur a monthly expense wherever possible. Paths were also selected for the lowest antenna height possible.
Although listed in this proposal, and part of the final proposal and network configuration, some paths are already constructed, and there may be no additional equipment required for completion. This includes the paths from Mt Eldon to the Lake Mary Water Treatment Plant, Wildcat Hill Plant, and Cinder Lakes Landfill.
Each of the paths in this proposal will require a full field engineering review, prior to proceeding with installation, the costs of this review are included in the proposal budget.

Project Budgetary Quotation

Niles Radio Communications is recommending a Budgetary fund for this project in the amount of $650,000. As of June 1, 2015, the actual anticipated expenses are:

Radio Equipment and Antennas	$356,228.00
McMillan Mesa Tower / Cabinet	$ 83,355.00
AquaPlex Antenna Mounting Hardware	$ 12,000.00
Installation and Configuration Labor	$ 67,000.00
Engineering and Frequency Coordination	$ 28,800.00
Total Budgetary Quotation	**$547,383.00**

This budgetary quotation is exclusive of any Permits and fees that may be required, including sales and use taxes, building permits or other regulatory fees, other than FCC

fees (none anticipated) and frequency coordination fees, which are included in the proposal.

System Engineering Required

Radio Paths

This proposal depicts the costs for this proposal based on the required sites and locations to have service, and the available locations to provide service from. A matrix of locations was reduced to the quoted paths, to produce this quotation, and it is anticipated that the final system engineering will closely fit with this proposal.
The most immediate system engineering step, is to evaluate each of the terminating locations for path suitability, mounting infrastructure requirements, and line of sight path clearances. For each path, Niles Radio will then provide a Frequency Coordination service, which proceeds from a frequency availability search, selecting a suitable and available frequency, performing an interference analysis to assure interference free operation to and from other licensees.
Once a suitable frequency has been selected, we notify all potentially affected licensees of the frequency coordination request, in a process known as Prior Coordination Notification (PCN) which takes about 30 days. During this time, if any existing licensee has any issue, we work to resolve the issue, culminating in an approved and coordinated frequency and evidence of frequency coordination that is filed with the FCC for the frequency authorization.
Once this has been completed for each of the sites in the proposal, a final equipment and material list is provided, detailing the exact radio and antenna required for each path, and all cabling or frequency affected components. At this time, the quotation becomes firm and no other equipment changes, charges costs or expenses are anticipated.
The majority of the paths are engineered for 23 and 38Ghz frequency bands. Some of these may not be available due to other licensees or other issues, and we would then need to select other frequency bands. Not quoted in this proposal are 70-90Ghz frequency band equipment, which is also licensed, that may be selected for paths up to 1 mile in length. The proposal does not include these “Millimeter Wave” radios as they result in an increase in path cost of about $10,000 per path. The radios otherwise have incredible reliability and path security regardless of which band is chosen.
Some of the paths are engineered using unlicensed radio equipment (none of the primary paths) , which are the same manufacturer as the other radios, but utilize frequencies that do not require licensing. These paths will require evaluation to determine suitability for these radios, which may result in different equipment being selected, also increasing the overall system, cost.

MacMillan Mesa

The MacMillan Mesa site will have the existing tower removed and replaced with a microwave tower to support many of the radio paths. This site is also quoted based on an estimate of normal soils and no issues from other potentially affected parties.
A check of the FAA requirements for this site does not indicate that this tower require lighting, however, if the City of Flagstaff desires that the tower be lighted, there will be additional expenses for the lighting and monitoring equipment, as well as ongoing tower lighting monitoring and maintenance expenses.
The Tower engineering, soils analysis and loading analysis will be performed as well as a finalized foundation design and any tower changes, in the first phase of the project. Niles Radio does not anticipate any changes to the proposed costs for the tower as proposed.

Niles Radio is proposing a 7' outdoor cabinet with air conditioning and heating to support the equipment at this site. If the city desires a full shelter (the existing shelter is not acceptable for this communications / data center), there will be an additional expense, but it will not affect Niles Radio Communications ability to provide for timely construction and completion.
Appendix A has additional details for each path and expense category.

Dedicated Internet Access Bandwidth (DIA)

Niles Radio can provide Dedicated Internet Access services. We require a 3 year contract commitment for access, billing is monthly.

40Mbps	**$9,528.00 / Year**
100Mbps	**$23,460.00 / Year**

DIA Bandwidth above 100Mbps, up to and including 1Gbps are available, but require a 5 year services contract and specific engineering. Your requested bandwidth was for 20Mbps.
DIA Internet access includes point to point network service for routing existing IP segments to this network, IPv4 /24 networks as required with network utilization justification for ARIN, and a IPv6 /64 (18,446,744,073,709,551,616 addresses) or larger site network assignment as required.

This includes Configuration, Port and Loop charges.
Direct Internet Access is provided via Niles Radio Communication's fiber connection at their offices at 1602 N. East St., and additionally may be fed to the network from their Mt. Elden Radio facilities. All services are provided to Niles Radio under contract from Level 3 Communications (http://www.level3.com) on the CenturyLink fiber network. This allows Niles Radio Communications to provide a comprehensive communications portfolio. Usage of CenturyLink circuits also allows that improvements to that network will improve connectivity in the event of outages to remote parts of the routed fiber network.
Do note that outages of any kind, on the CenturyLink or Level3 Fiber network, will not interrupt site to site communications within this proposed network.

Site Rental Expenses

For the radios located at Mt. Eldon, there is a monthly charge for the site rental. This rate is typically $150.00 per foot of dish diameter, for which the City of Flagstaff receives a 50% discount from that rate.
At this time, the IT department has three links on Mt Eldon, one each to City Hall, Wildcat Hill, and the Landfill, for which they are charged about $375.00 per month. The water department has an additional link to the Lake Mary Water Treatment Plant and to McMillan Mesa, for which they are charged $525.00 per month, for a total monthly billing of $900.00 per month.
After all sites are in place, the total anticipated monthly site rental for IT and the Water Department microwave systems combined is $1,500.00 per month, an increase of $600.00.

Table of Anticipated Monthly Site Rental Charges:

Path Name	Department	Dish Size	IT	WATER	CCSO

ME0 to City Hall	IT	2	$150.00		
ME0 to LMWTP	WATER	6		$450.00	
ME0 to LEAF	CCSO	3			$225.00
ME0 to Landfill	IT	2	$150.00		
ME0 to McMillan Mesa	IT	4	$300.00		
ME0 to Fire Station 4	IT	1	$75.00		
ME0 to Wildcat	IT	1	$75.00		
ME0 to Rio de Flag	IT	4	$300.00		
			$1,050.00	$450.00	$225.00

Figure 1 - Monthly Site Rental

The CCSO to LEAF Link is already under contract and will be modified to carry the additional IT traffic to be relayed. This will not result in any changes to the monthly billing that CCSO is anticipating at this time.
The CCSO LEAF link and the drop from LEAF to Fire Station 2 will likely require that CCSO enter into an IGA due to the mixed nature of the traffic on this facility.

Microwave Radio Equipment Warranty and Service Options

All of the proposed equipment includes a Manufacturer's warranty, most of which are 12 month limited warranty.
The purchase price for the proposed Cambium Microwave Radio Equipment includes a 12-month limited warranty to the original purchaser for the hardware components. This means a defective hardware component will typically be repaired or replaced within 30 days of return. In addition to the initial hardware repair-and-return program for damaged parts, the Standard Warranty for our PTP Series radios also includes minor software updates as they become available during that initial 12 month period. You can count on our 24 x 7 Support worldwide. Upon receiving your PTP product from Cambium, Niles Radio Communications will register your standard warranty online and activate the free 12-month warranty period and to obtain the notifications of software updates.

Equipment Spares

While this protects the IT microwave radio network against warrantable failure, there is the issue of the 30 day period of time between returning the equipment for service, and the return of the repaired equipment.
Niles Radio Communications recommends that at a minimum, and within the first 12 months service period, that the City of Flagstaff obtain an inventory of service center (Niles Radio) maintained spares representing one article of each piece of equipment in service, and two articles of each backbone equipment article in service. Niles Radio will develop the 'Spares' equipment list, at the time of final system engineering, after frequency coordination. Niles Radio cannot provide a useable estimate of the required spares until the engineering process has been completed.
As an alternative or in addition to a comprehensive on hand spares inventory, Niles Radio and Cambium offer an extended warranty programs for this equipment. Any time after the purchase of your equipment with its 12-month Standard Warranty, you have the option to purchase an Extended Warranty. There are two types of Extended Warranties to receive upgraded and/or extended equipment coverage with technical support and software updates:
• Extended Warranty with and additional one, two or four years of return-and-repair equipment coverage; and
• All Risks Advance Replacement program with an additional one, two or four years of extra equipment coverage.

EXTENDED WARRANTY AND ALL RISKS ADVANCED REPLACEMENT

With All Risks equipment coverage and the Advanced Replacement program, these premier PTP Extended Warranties upgrade and extend the initial 12-month Standard Hardware Warranty for up to five years.

The All Risks coverage provides hardware repair and replacement for all types of equipment damage, including:

- Hardware defects and failure
- Lightning and weather damage
- Dropped unit
- Fire damage
- Vandalism

The Advanced Replacement Program includes shipment of replacement product from Cambium Networks on the next business day after receipt of a confirmed RMA. When the RMA is approved, we pay the shipping costs in both directions. While the replacement shipping process will be started immediately, upon receipt of an approved RMA, replacement product is shipped using priority courier. Delivery time will depend upon ship-to location and any customs clearance time.

EXCLUSIONS TO STANDARD WARRANTIES

The initial 12-month Standard Hardware Warranty for any PTP product does not apply to:

• Defects or damage resulting from use of the Product(s) in other than their normal and customary manner.
• Defects or damage occurring from misuse, accident, liquid intrusion or neglect.
• Defects or damage from improper or unauthorized testing, operation, maintenance, service, repair, installation, alteration, modification, or adjustment.
• Product(s) that have been subjected to illegal or unauthorized alteration of the software/firmware.
• Scratches or other cosmetic damage to Cambium Product(s) surfaces that do not affect the operation of the Product(s).
• Product(s) from which Cambium serial numbers, warranty data, tamper-proof seals, or quality assurance decals have been removed or altered.
• Normal and customary wear and tear.
• Damage caused by lightning or other static discharge.

EXCLUSIONS TO ALL RISKS ADVANCED REPLACEMENT WARRANTIES

• Defects or damage from improper or unauthorized testing, operation, maintenance, service, repair, installation, alteration, modification, or adjustment.
• Product(s) that have been subjected to illegal or unauthorized alteration of the software/firmware.
• Scratches or other cosmetic damage to Cambium Product(s) surfaces that do not affect the operation of the Product(s).
• Product(s) from which Cambium serial numbers, warranty data, tamper-proof seals, or quality assurance decals have been removed or altered.

At this time, the all risks equipment coverage is limited to a 5 year period from the date of purchase.

Niles Radio will provide the costs for the Warranty and Spares Options in detail, after all paths have been fully engineered and the detailed equipment list is determined.

Estimate: All Risks Coverage with Advanced Replacement Warranty

As a rough estimate, the cost of providing coverage for all of the links in this proposal, for a period of 5 years, is about $75.00 per month, per link. There are currently 21 links required in the proposed system, resulting in a monthly cost of $1575.00. This cost is invoiced at the time of purchase, for the entire 5 year period.

Estimate: Depot Return and Repair (30 Day) Warranty

As a rough estimate, the cost of providing coverage for all of the links in this proposal, for a period of 5 years, is about $35.00 per month, per link. There are currently 21 links required in the proposed system, resulting in a monthly cost of $735.00. This cost is invoiced at the time of purchase, for the entire 5 year period.

Estimate: Spares Inventory

The maximum estimated cost of providing for a comprehensive set of systems spares is approximately $41,980.00. This amount is dependent on the number of unique pieces of equipment necessary to deploy the microwave system, and cannot be determined until the system engineering has been completed.

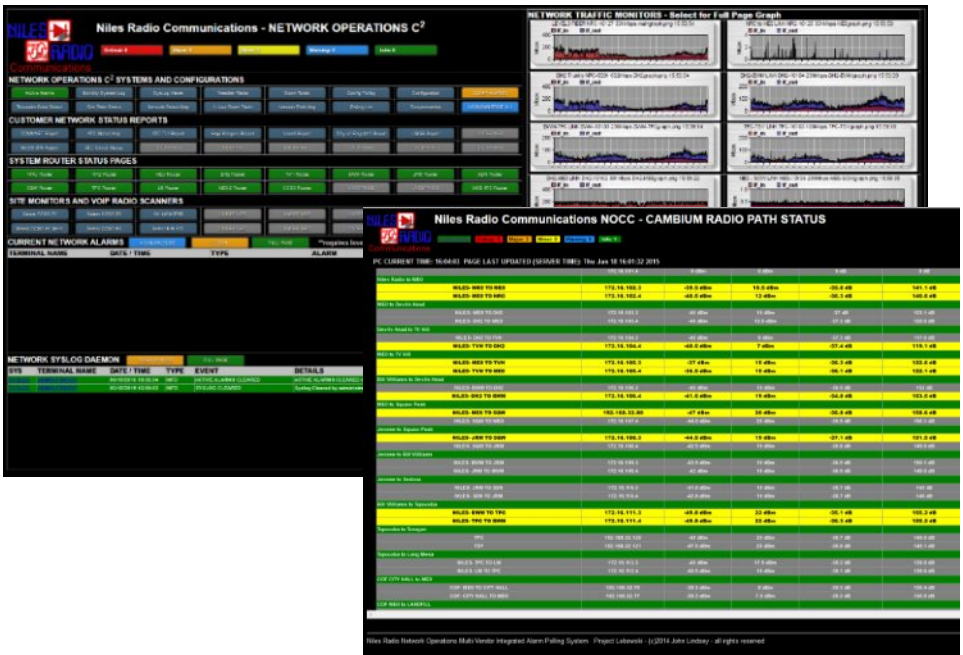
Niles Radio Service Recommendation

Niles Radio Communications recommends that the City of Flagstaff acquire a comprehensive Spares Inventory, and within the first year, update all radios to a Depot Return and Repair grade warranty for a period of 5 years.
The All Risks warranty is not quite cost effective for this application.
After the five year warranty and service period has expired, Niles Radio will provide maintenance services that include depot return and repair, under a time and material basis, using the spares inventory to backstop the system, and always replacing with new or refurbished equipment, any equipment that fails while in operation, maintaining a full spares complement.

Niles Radio NOC^2 Monitoring Services

Niles Radio Communications will provide NOC^2 (Network Operations Center Computer) monitoring of your deployed system, and will respond within a two (2) hour period, to any failures detected on the network, including alarms that do not result in any loss of network function.
Niles Radio maintains M-F 8:00 AM to 5:00PM manned monitoring service at its offices, and the system monitors the network 24X7 notifying on call technicians who have full network access at all times, at all other hours.

Niles Radio charges a $24.00 per month fee for each monitored link, and maintains administrator access to the network hardware at all times. This access does not grant any access to the customer payload traffic on the network, and as such, we do not monitor your actual traffic and cannot monitor routed traffic issues, but monitor the radio performance and all faults.



Each radio link is tested every 24 hours to monitor for link trend issues, and is tested every three minutes for any operational faults.
Detection of a fault results in a technician 'logging into' the link to determine the nature of the fault and dispatch a repair service call as and if appropriate. We typically know if any system failure before traffic is affected. This is a 24 Hours a day, 7 day a week service.
In all cases, a fault that requires an on-site response results in a Time and Material charge for the service, typically $65.00 per hour. This is not covered by the manufacturer's equipment warranty.
If a radio path fault cannot be cleared, the failed equipment will be removed from service, replaced with either a new unit at fee, or with a spare equipment from the user spares, and the failed equipment will be returned to Cambium for repair.

Selection of Niles Radio Communications

Niles Radio Communications proposal is a continuation and extension of the Microwave Radio Networking services that Niles Radio Communications has been providing to the City of Flagstaff IT infrastructure. To continue this service and to move forward with the network upgrades in a timely manner, Niles Radio is requesting that the City of Flagstaff evaluate Niles Radios network proposals on the basis of providing these services and equipment as a sole source provider.
As such, Niles Radio Communications is not requesting or suggesting that Niles Radio Communications is the only provider capable of providing these services, but that Niles Radio Communications is the selected vendor that is capable of providing for the necessary system infrastructure and services with a single vendor selection.
Niles Radio Communications would like to present its reasoning for this selection as follows:

- Niles Radio is a Flagstaff local vendor, locally owned and operated since 1954. There are no other local vendors that own or operate Microwave Radio Communications facilities on Mt. Eldon.
- Niles Radio has the necessary infrastructure, in place, and already in use, for the proposed services:
    - Mt. Eldon 109' Radio Facility
    - Devils Head 110' Radio Facility
    - TV Hill 107' Radio Facility
        - All of these facilities are located on top of Mt. Eldon, and consist of Microwave grade towers, are microwave interconnected to Niles Radio Communications fiber fed network infrastructure, have backup generators and primary -48VDC microwave radio power systems, are environmentally controlled and currently house city of Flagstaff, county and State communications equipment. No other vendor has Microwave Radio sites at all of these locations. (Niles Radio has many other facilities located across Northern Arizona).
- Niles Radio holds an approved and current Arizona State Contract for the proposed equipment, ADSPO13-055855, as well as other Arizona State contracts for radio communications equipment and services. Niles Radio Pricing for equipment is already competitively established under these contracts.

- Niles Radio is already providing microwave radio communications services and equipment for:
    - IT Services: City Hall to Mt. Eldon
    - Mt. Eldon to Cinder Lakes Landfill
    - Mt. Eldon to Wildcat Hill WWTP
    - Mt. Eldon to Lake Mary WTP
    - Mt. Eldon to Rio de Flag WWTP (Completion date 6/2015)
    - Mt. Eldon to USGS Radio Site
- Utilizing the Same Equipment already selected and operational provides for operational equipment sparing and minimal equipment inventory management, as well as extremely fast proposal to operational link establishment.
- Utilizing Niles Radio Communications sites for the upper network hardware layer, provides for single vendor utilization and already discounted and in place site lease terms.
- Utilizing Niles Radio Communications sites precludes the requirement to authorize technicians from other vendors to access competing vendor sites, eliminates co-insurance requirements, and eliminates the need for additional microwave paths to interconnect other vendor sites into a common network.
- Utilizing Niles Radio Communications sites will result in the lowest monthly recurring expenses.
- Niles Radio has a regional 70-90Ghz License WQQA631 for immediate link licensing of extremely secure millimeter-wave paths up to 5 miles in length.
- Niles Radio Communications provides all Licensing and Link Coordination and Engineering Services in house.
- Niles Radio Monitors and Maintains all FCC Licenses, once granted, for no additional fees.
- Niles Radio has Cisco Certified technicians on staff, and is a full Network and Microwave Services integrator.
- JC Cullen, Inc. DBA Niles Radio Communications is an Arizona State Licensed Contractor, specializing in our field of Communications.
- Niles Radio Communications has installation and maintenance staff in place, resident in Flagstaff, with 24X7 availability and a typical 2 Hour response time for maintenance issues.
- Niles Radio Communications maintains its own Snow-Cats for mountain top access in any weather conditions.
- Niles Radio maintains a 24X7 NOC (Network Operations Control) for systems operational management and alarm response on all monitored customer networks and typically responds to issues before the customer is even aware of a problem.

Upgrades to Existing IT Infrastructure

McMillan Mesa SITE

The McMillan Mesa tower, which was relocated to this site behind USGS in November 1986, will be the primary communications hub for the IT Microwave Network. This tower, however, is insufficient in both height and structural integrity for this proposed application. The existing tower is 62’ in height, with antennas and appurtenances that top out at 84’ above ground level.

Niles Radio proposes to replace this tower with a 100’ four leg tower that can support the required microwave antennas, have expansion room for additional antennas, and support the relocated Fire, water and utilities antennas. The existing tower will be removed.

Niles Radio has checked the McMillan Mesa tower with the FCC TOWAIR application, to determine if this tower needs registration with the FCC and FAA, or if it requires tower lighting, and it does not, per TOWAIR.

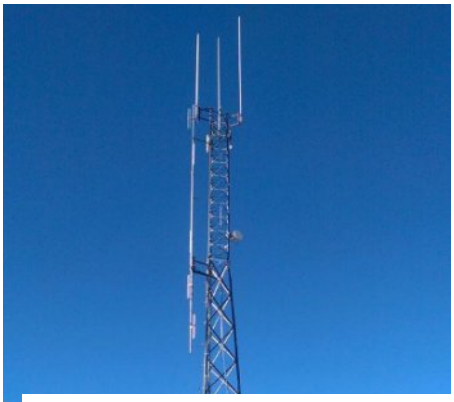


Figure 2 - McMillan Mesa Existing Tower

However, TOWAIR's findings are not definitive or binding, and we cannot guarantee that the data in TOWAIR are fully current and accurate. In some instances, TOWAIR may yield results that differ from application of the criteria set out in 47 C.F.R. Section 17.7 and 14 C.F.R. Section 77.13.

If this had been a positive finding by TOWAIR recommending notification it would certainly be given considerable weight. On the other hand, a finding by TOWAIR recommending either for or against notification is not conclusive. Therefore, Niles Radio recommends that we take responsibility as an ASR participant to exercise due diligence to determine if we must coordinate this structure with the FAA. TOWAIR is only one tool designed to assist ASR participants in exercising this due diligence, and further investigation may be necessary to determine if FAA coordination is appropriate.

What this means is that, although not required, we should register this facility with the FAA and FCC as an existing facility, proceed to an upgrade, and if on the determination of the FAA that the tower represents any form of hazard, that we apply the appropriate recommendations for lighting, as and if required. This could result in additional expenses, and will require monitoring of the lighting status, if required.

Tower Structural Notes

The McMillan Mesa tower will require a substantial tower foundation, which will be designed in accordance with EIA/TIA222-G standards. A preliminary design has been created for this foundation and structure, which will be further reviewed, evaluated and certified by an Arizona PE.

SLAB FOUNDATION DESIGN:

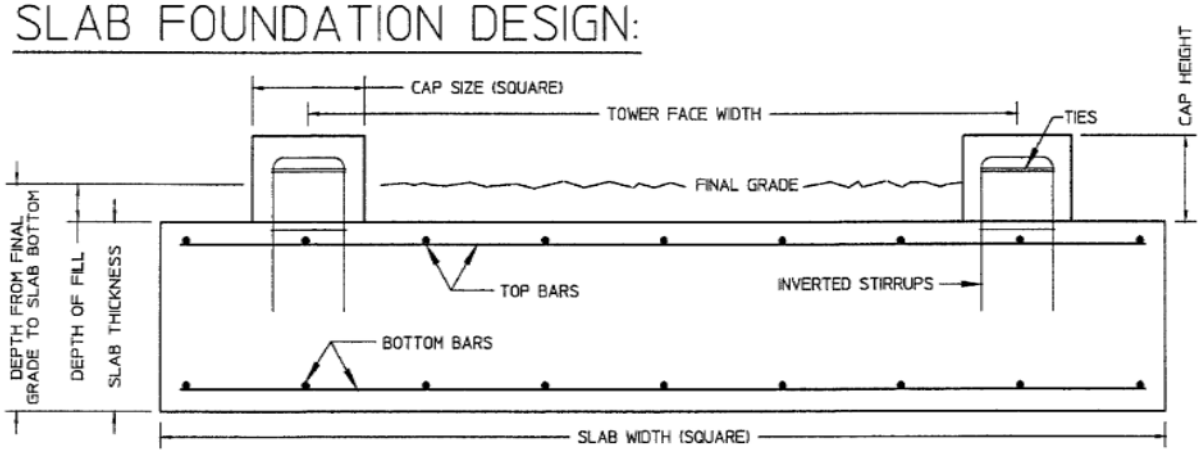


Figure 3 – Tower Foundation Design

DIMENSIONS:

Slab width = 20.0 feet
Slab thickness = 24.0 inches
Cap height = 12.0 inches
Cap size = 30.0 inches
Tower face width = 9.00 feet
Number of tower legs = 4
Depth of fill = 0.000 inches
Depth from final grade = 0.000 feet to slab bottom

MATERIAL PARAMETERS:

Ultimate net soil bearing pressure = 4.00 ksf

Concrete compressive strength = 3000 psi
Rebar yield strength = 60000 psi
Density of concrete = 0.150 kcf
Density of soil = 0.100 kcf
Density of fill = 0.000 kcf
Allowable stress increase factor = 1.00

TOWER BASE REACTIONS:

Overturning moment = 987 ft-kips
Total tower shear = 17.4 kips
Maximum leg shear = 4.90 kips
Tower weight = 13.5 kips

NOTES:

1. If "depth of fill" or "depth from final grade to slab bottom" are not known, they are conservatively assumed to be zero.
2. This design methodolgy assumes a rigid slab (Ref. ACI 336.2 R-88).
3. The slab may be raised above the ground and the caps eliminated unless noted otherwise (subject to local minimum frost depth restrictions).

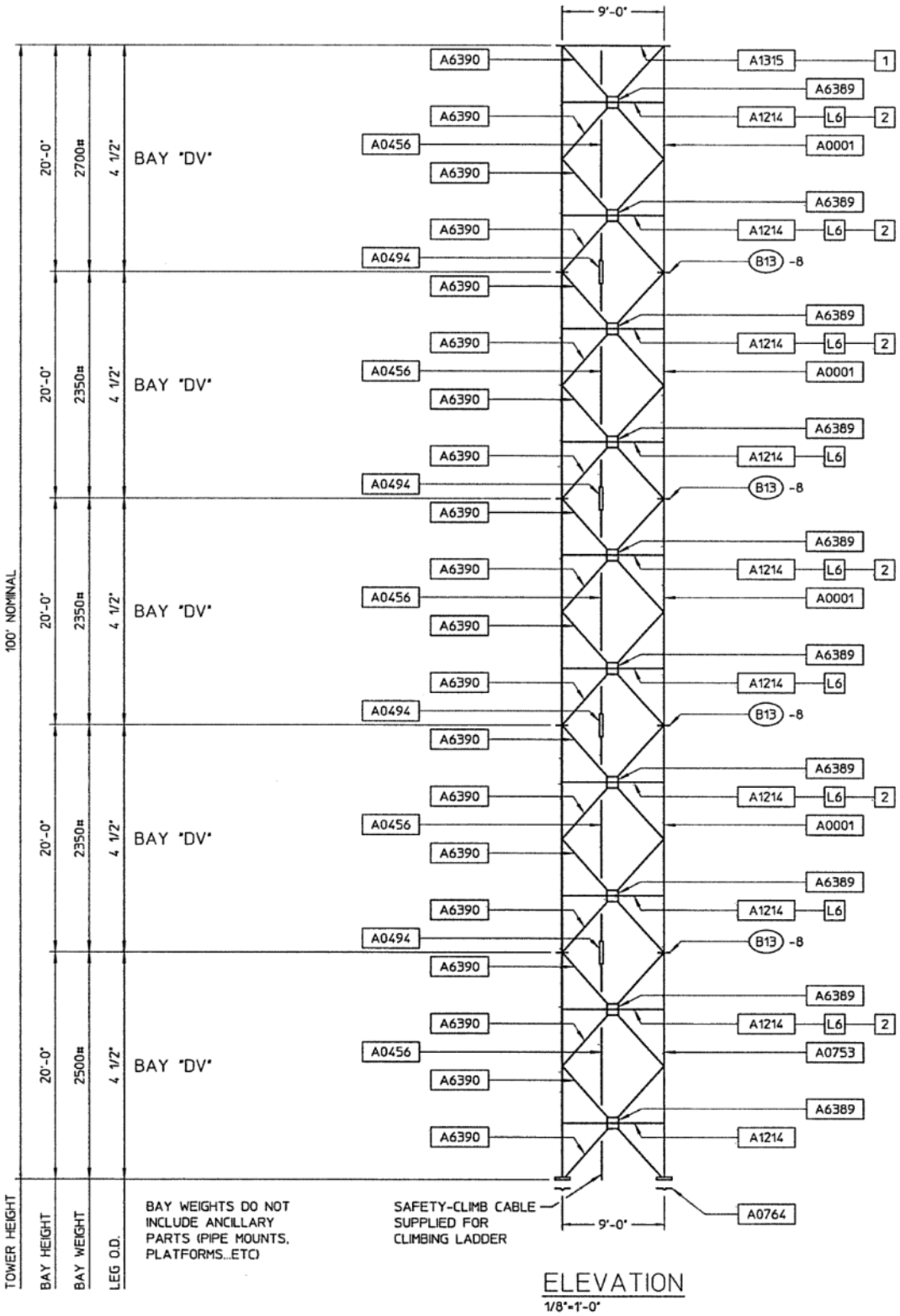
OUTPUT SUMMARY:

Stability ratio = 1.19 OK
Net soil bearing pressure = 1.48 ksf OK
Volume of concrete = 30.6 cu. yds.
Slab two-way shear: OK
Slab beam shear: OK

REINFORCEMENT REQUIREMENTS: (ASTM A615 Gr. 60)

Minimum reinforcement areas: Top bars = 3.83 sq. inches, Bottom bars = 6.53 sq. inches.
Top bars: Use 20-#4 (each way) @ 12.32 inch spacing, length = 19.50 ft., total weight = 521 lbs.
Bottom bars: Use 22-#5 (each way) @ 11.14 inch spacing, length = 19.50 ft., total weight = 895 lbs.
Use 3-#4 Ties, 24 in. sq. @ 12 in. spc. (per cap), double @ top.
Use 4-#5 Inverted Stirrups, 31 in. x 21.5 in. x 31 in. (per cap).

Tower Design



The tower is designed with straight legs from base to top, to allow for installation of Microwave antennas at any location on the tower, directly to

the legs of the tower, facing any azimuth, without the requirement for separate antenna mounts and pipes for each antenna.
This reduces the physical loading of the tower, reduces the overall size of the tower, allows for much higher loading to structural weight and reduces the visual impact of the tower. Having a tower that can have antennas installed at any height allows us to minimize the actual antenna installation elevation to the minimum required for path clearance. It also allows for a great degree of expansion without requiring an engineering stress and loading analysis prior to each antenna installation.
The tower is equipped with a safety climbing system, which is a 100% tie off steel cable that runs the length of a ladder that is placed inside the tower. This allows the tower to be climbed to any height, safely, without negotiating antennas mounted to the climbing legs.
The ladder can be seen in the bracing diagramming, ascending the center of the tower, with the cable runs on either side of the ladder, this is continuous for the entire height of the tower and is a key safety feature.

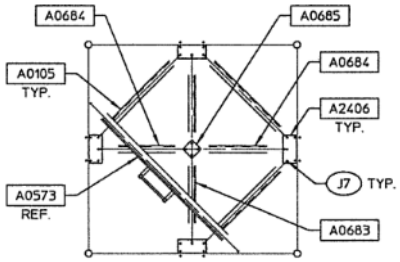


Figure 4 - Tower Inside Bracing and Ladder

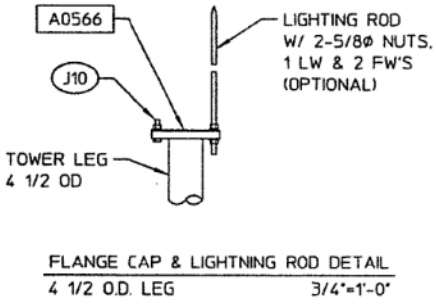


Figure 5 - Tower Lightning Rod

The tower is equipped with a lightning rod to prevent direct lightning strikes from impacting the installed radio antennas as well as provide for a safe operating environment during lightning storms.

McMillan Mesa Shelter

In addition to replacing the tower, Niles Radio will be installing a steel 7' cabinet, which includes air conditioning and heat, to house the equipment, instead of inside the shelter, as the shelter has exceeded its usefulness and is not suitable for placement of the network equipment.
Should the City desire to replace the shelter, Niles Radio can provide a multi-room shelter that will keep the IT network equipment separated from other users at the site. This is a considerable additional expense, and Niles Radio believes that the cabinet solution is more appropriate.

Figure 6 - McMillan Mesa Cabinet

The selected cabinet is a DDB Unlimited LTEE-A weatherproof outdoor electronics enclosure with climate-control system. It has two (2) sets 19" EIA racking rails with 27RU (rack units) of available vertical rack space. A 6000 BTU air conditioner for cooling with 400 watts of heat when needed; insulation is R3.3 closed cell foam. The cabinet has above door fluorescent lighting. The cabinet has a NO/NC door alarm switches for intrusion notification, which is monitored by the Niles Radio NOC. A spool-up side box for fiber and RF cable spooling is included with a copper ground bar on insulators inside the spool-up box. A separate battery compartment below the equipment space holds battery back-up power. The assembly is GR 487 rated with a baked on white textured powder coat finish. It will be installed on the Tower foundation slab, providing an environmentally controlled rodent and pest free equipment environment for this critical installation.

Microwave Equipment Listing

Link name	Product	Local antenna	Remote antenna	Max aggregate IP throughput (Mbps)
McMillan Mesa to Adult Center	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	100.00
McMillan Mesa to East Side Library	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	400.00
McMillan Mesa to Fire Station 1	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	100.00
McMillan Mesa to Fire Station 5	PTP650	Cambium Networks 2ft Dual-Polar Parabolic RDH4503	Cambium Networks 2ft Dual-Polar Parabolic RDH4503	411.42
McMillan Mesa to Jay Lively Ice Rink	PTP650	Cambium Networks Integrated Dual Polar Antenna	Cambium Networks Integrated Dual Polar Antenna	100.18
McMillan Mesa to ME0	PTP18820S	Cambium Networks 4ft Single Pol (NA & CALA Only) N180082D054 - Direct	Cambium Networks 4ft Single Pol (NA & CALA Only) N180082D054 - Direct	1210.50
McMillan Mesa to NAU Internet	PTP18800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089057 - Direct	Cambium Networks 1ft HP Antenna 85010089057 - Direct	600.00
McMillan Mesa to Warehouse	PTP18800 with ODU-B	Cambium Networks 2ft HP Antenna 85010089042 - Direct	Cambium Networks 2ft HP Antenna 85010089042 - Direct	200.00
City Hall to Coconino County	PTP38800 with ODU-A	Cambium Networks 1ft HP Antenna 85010089063 - Direct	Cambium Networks 1ft HP Antenna 85010089063 - Direct	301.12
City Hall to ME0	PTP23800 with ODU-B	Cambium Networks 2ft HP Antenna 85010089043 - Direct	Cambium Networks 2ft HP Antenna 85010089043 - Direct	604.31
Airport Terminal to Airport Fire	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010092011 - Remote	Cambium Networks 1ft HP Antenna 85010092011 - Remote	200.00
ME0 to LMWTP	PTPL6800 with ODU-A	Cambium Networks 6ft HP Antenna 85010092021 - Remote	Cambium Networks 6ft HP Antenna 85010092021 - Remote	200.00
ME0 to Wildcat Hill Plant	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	200.00

Link name	Product	Local antenna	Remote antenna	Max aggregate IP throughput (Mbps)
ME0 to Landfill	PTP18800 with ODU-B	Cambium Networks 2ft HP Antenna 85010089042 - Direct	Cambium Networks 2ft HP Antenna 85010089042 - Direct	116.98
AquaPlex to Flag Recreation Center	PTP650	Cambium Networks Integrated Dual Polar Antenna	Cambium Networks Integrated Dual Polar Antenna	100.18
ME0 to Fire Station 4	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	100.00
AquaPlex to Housing Authority	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	100.00
LMWTP to Fire Station 6	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	100.00
McMillan Mesa to City Hall	PTP18820S	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	1210.51
McMillan Mesa to Airport Terminal	PTP11800 with ODU-B	Cambium Networks 4ft HP Antenna 85010089052 - Direct	Cambium Networks 4ft HP Antenna 85010089052 - Direct	200.00
ME0 to Rio De Flag Plant	PTP11800 with ODU-B	Cambium Networks 4ft HP Antenna 85010089052 - Direct	Cambium Networks 4ft HP Antenna 85010089052 - Direct	200.00
AquaPlex to East Side Library	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	300.00
LEAF to DH2	PTP23800 with ODU-B	Cambium Networks 2ft HP Antenna 85010089043 - Direct	Cambium Networks 2ft HP Antenna 85010089043 - Direct	101.76
LEAF to ME0	PTP18800 with ODU-B	Cambium Networks 3ft HP Antenna 85009298006 - Direct	Cambium Networks 3ft HP Antenna 85009298006 - Direct	300.00
LEAF to Fire Station 2	PTP23800 with ODU-B	Cambium Networks 1ft HP Antenna 85010089059 - Direct	Cambium Networks 1ft HP Antenna 85010089059 - Direct	100.00

Part Number	Qty	Description
01010411007	1	ODU-A 6GHz, TR252, Lo, B1 (5925.0 - 6025.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
01010411008	1	ODU-A 6GHz, TR252, Hi, B1 (6175.0- 6275.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
01010419001	24	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
01010433002	1	ODU-A 38GHz, TR700, Lo, B1 (38595.0 - 38805.0 MHz), Circular WG, Neg Pol. Please select a TX frequency
01010433003	1	ODU-A 38GHz, TR700, Hi, B1 (39295.0 - 39505.0 MHz), Circular WG, Neg Pol. Please select a TX frequency
07009304001	40	Hoisting Grip for CNT-400 cable
07010109005	2	ODU Remote Mount Kit 18 ~ 26 GHz - UBR220 output
07010109008	2	ODU Remote Mount Kit 6 GHz - UDR70 output
07010118001	4	WR137 Flex Twist Hanger Kit
07010118005	4	WR42 Flex Twist Hanger Kit
30010194001	20	50 Ohm Braided Coaxial Cable - 75 meter
58010076011	2	Flexible Twist,WR42,PBR220,35.0 inch,UBR220,17.7-26.5 GHz,VSWR 1.25
58010076017	2	Flexible Twist,WR137,PDR70,35.0 inch,UDR70,5.85-8.2 GHz,VSWR 1.10
85009298006	2	3' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface
85009317001	2	ODU-B 11GHz, TR 490 & 500, Lo, B5 (10700.0 - 10890.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
85009317002	2	ODU-B 11GHz, TR 490 & 500, Hi, B5 (11200.0 - 11390.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
85009318001	4	ODU-B 18GHz, TR1560, Lo, B3 (17700.0 - 18140.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
85009318002	4	ODU-B 18GHz, TR1560, Hi, B3 (19260.0 - 19700.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
85009319001	12	ODU-B 23GHz, TR1200, Lo, B5 (21200.0 - 21600.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
85009319002	12	ODU-B 23GHz, TR1200, Hi, B5 (22400.0 - 22800.0 MHz), Rectangular WG, Neg Pol. Please select a TX frequency
85010089042	4	2' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface
85010089043	4	2' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface
85010089052	4	4' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, Mot Interface
85010089057	2	1' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface
85010089059	18	1' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface
85010089063	2	1' HP Antenna, 37.00 ~ 40.00 GHz, Single Pol, Mot Interface
85010092011	2	1' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol, PBR220

Part Number	Qty	Description
85010092021	2	6' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol, PDR70
C000065K022	6	PTP 650 Lite (Up to 125Mbps) to Full (Up to 450Mbps) Link Capacity upgrade license per ODU
C000065K040	6	PTP 650 Precise Network Timing Software License (per END)
C000065L007	6	PTP 650 LPU and Grounding Kit (1 kit per ODU)
C050065H008	2	PTP 650 Connectorized END with AC+DC Enhanced Supply (FCC/IC). Kit includes ODU, power supply, mounting bracket and US line cord
C050065H010	4	PTP 650 Integrated END with AC+DC Enhanced Supply (FCC/IC). Kit includes ODU, power supply, mounting bracket and US line cord
C180082B011	2	PTP 820S Radio 18WGHz,TR1560,ChAll,Hi,19259-19710MHz. Please select a TX frequency
C180082B012	2	PTP 820S Radio 18WGHz,TR1560,ChAll,Lo,17699-18150MHz. Please select a TX frequency
N000082L014	4	PTP 820 Glands_x5_KIT
N000082L016	2	PTP 820 CAT5E Outdoor 100m drum
N000082L017	8	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L022	4	PTP 820 PoE Injector all outdoor, redundant DC input, +24VDC support
N000082L034	4	PTP 820S Act.Key - Capacity 650M with ACM Enabled
N000082L073	4	PTP 820 GBE_Connector_kit
N000082L116	4	PTP 820 GROUND CABLE FOR IDU and ODU
N180082D052	2	PTP 820 2' ANT,SP,18GHz,RFU-C TYPE&UBR220 - Radiowave. Only available for order in North America and CALA regions
N180082D054	2	PTP 820 4' ANT,SP,18GHz,RFU-C TYPE&UBR220 - Radiowave. Only available for order in North America and CALA regions
RDH4503	2	5.25-5.85 GHZ, 2-FT (0.6M), WITH FINE ADJUSTMENTS. Not available in all regions - please check with your local supplier
WB3176	3	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)
WB3480	40	PTP800 Modem 1000/100BaseT with Capacity CAP 10 Mbps
WB3541	12	PTP800/PTP810 Modem Capacity CAP - 50 Mbps (per Unit)
WB3542	12	PTP800/PTP810 Modem Capacity CAP - 100 Mbps (per Unit)
WB3543	4	PTP800/PTP810 Modem Capacity CAP - 150 Mbps (per Unit)
WB3544	2	PTP800/PTP810 Modem Capacity CAP - 200 Mbps (per Unit)
WB3545	2	PTP800/PTP810 Modem Capacity CAP - 300 Mbps (per Unit)
WB3546	8	PTP800/PTP810 Modem Capacity CAP - 400 Mbps (per Unit)
WB3616	40	Coaxial Cable Installation Assembly Kit (W/O LPU End Kit)
WB3618	40	Mains Lead- US 3pin to C5 (PTP800 AC-DC PSU)
WB3622	40	AC-DC Power Supply Convertor (no lead cable included). Converts 110/230V to 48V.

Part Number	Qty	Description
WB3657	40	LPU END KIT PTP800 (1 kit required per Coaxial cable)

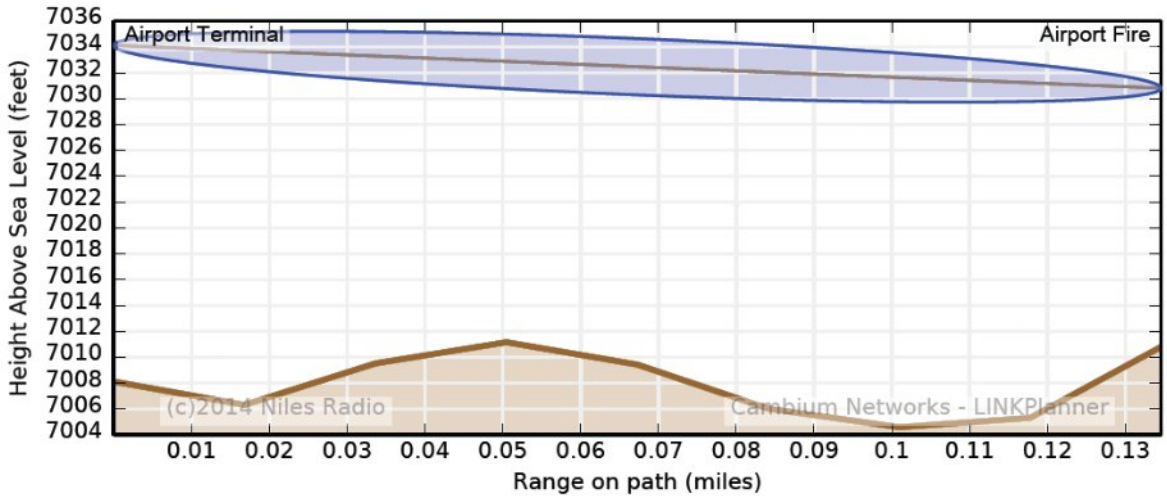
Path Descriptions

Airport Terminal to Airport Fire

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010092011 - Remote @ 26 ft

Cambium Networks 1ft HP Antenna 85010092011 - Remote @ 20 ft



	Performance to Airport Terminal	Performance to Airport Fire
Mean IP	100.0 Mbps	100.0 Mbps
IP Availability	100.0000 % for 100.0 Mbps	100.0000 % for 100.0 Mbps

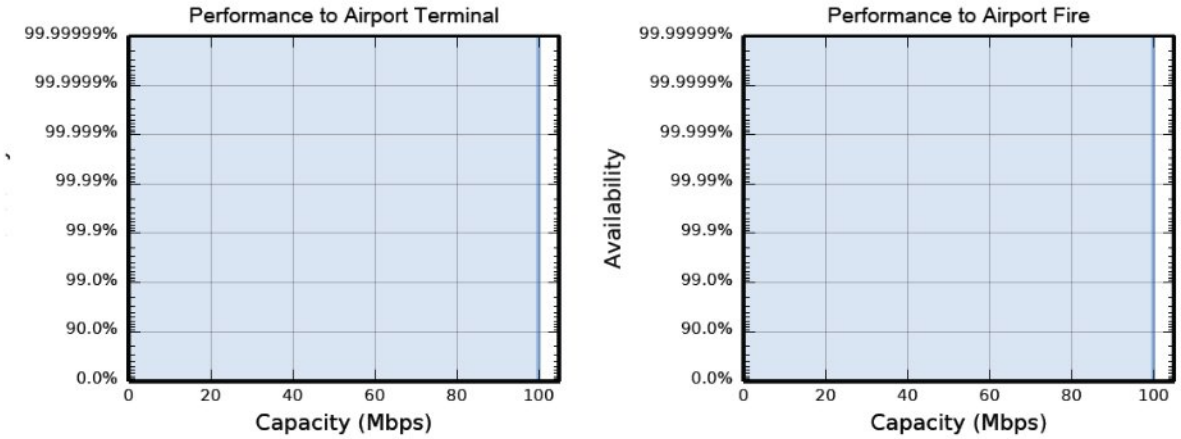
Link Summary

Link Summary			
Link Length	0.135 mi.	System Gain	140.51 dB
Band	23 GHz	System Gain Margin	34.32 dB
Regulation	FCC	Mean Aggregate Data Rate	200.0 Mbps
Modulation	256QAM 0.77 (114.4Mbps)	Annual Link Availability	100.0000 %
Bandwidth	20 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	106.19 dB	Prediction Model	ITU-R

This path is a short haul link, from the Airport terminal, which is connected to McMillan Mesa. Engineering review indicated that the path from the Airport Fire Station to McMillan Mesa, was blocked by trees, and is not suitable, so the path first goes to the Airport terminal building, before being dropped to the fire station.

The licensed capacity of this link is 100Mbps, which exceeds the 50Mbps applied to other Fire Station links, but can be limited to the same throughput as the other stations.

Performance Charts



Climatic Factors, Losses and Standards

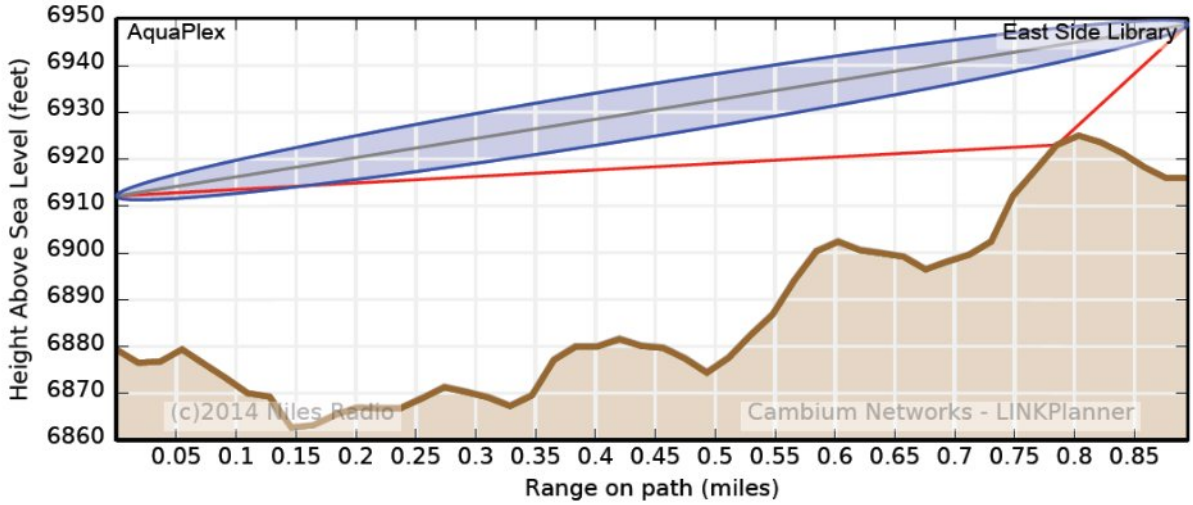
dN/dH not exceeded for 1% of time	-251.94 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	349.20 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	6.71e-11	Rain Unavailability	0 secs/year
Path inclination	4.66 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.83 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	106.17 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.02 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

AquaPlex to East Side Library

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft



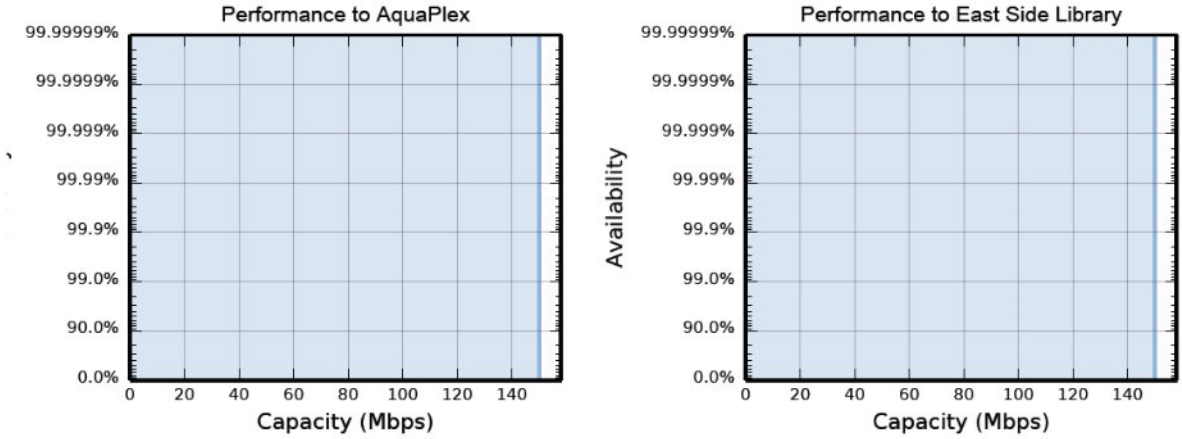
	Performance to AquaPlex	Performance to East Side Library
Mean IP	150.0 Mbps	150.0 Mbps
IP Availability	100.0000 % for 150.0 Mbps	100.0000 % for 150.0 Mbps

Link Summary

Link Summary			
Link Length	0.895 mi.	System Gain	155.01 dB
Band	23 GHz	System Gain Margin	32.23 dB
Regulation	FCC	Mean Aggregate Data Rate	300.0 Mbps
Modulation	256QAM 0.80 (177.44Mbps)	Annual Link Availability	100.0000 %
Bandwidth	30 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	122.78 dB	Prediction Model	ITU-R

The AquaPlex is used as an East Side relay point, receiving traffic from McMillan Mesa via East Side Library, for relay to the Housing Authority and Flagstaff Recreation Center. Its bandwidth is configured as 150Mbps, allowing 50Mbps for AquaPlex and the two sites that it relays. The quotation includes the radio link equipment for this site, but does not include a router and switch, nor any cabinet for this equipment, which will need to be determined in the engineering phase of the project.

Performance Charts



Climatic Factors, Losses and Standards

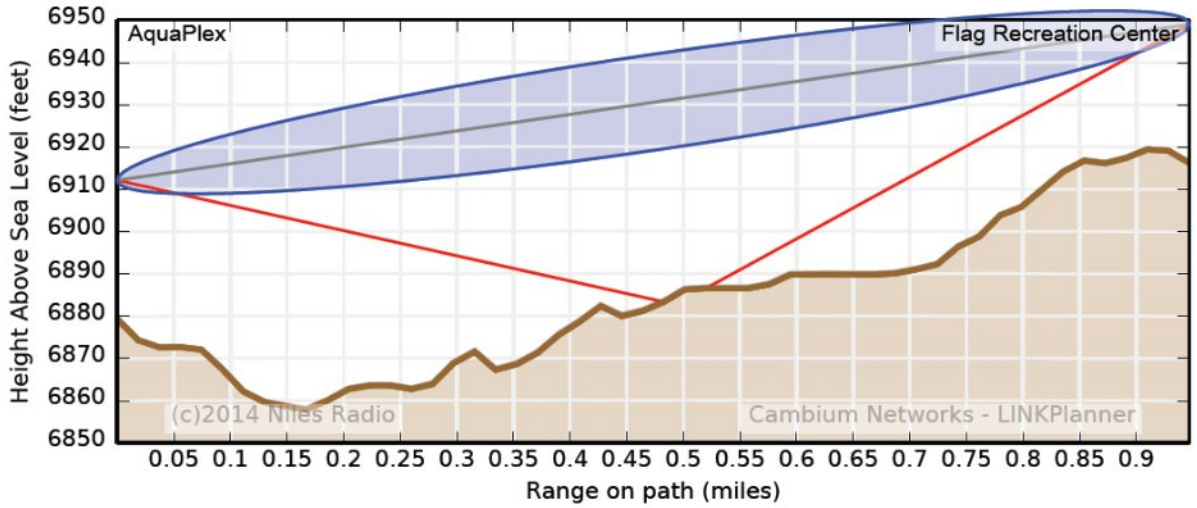
dN/dH not exceeded for 1% of time	-249.69 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	337.23 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	2.02e-08	Rain Unavailability	0 secs/year
Path inclination	7.76 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.27 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	122.62 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.16 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

AquaPlex to Flagstaff Recreation Center

Equipment: Cambium Networks PTP650 Full Integrated

Cambium Networks Integrated Dual Polar Antenna @ 33 ft

Cambium Networks Integrated Dual Polar Antenna @ 33 ft



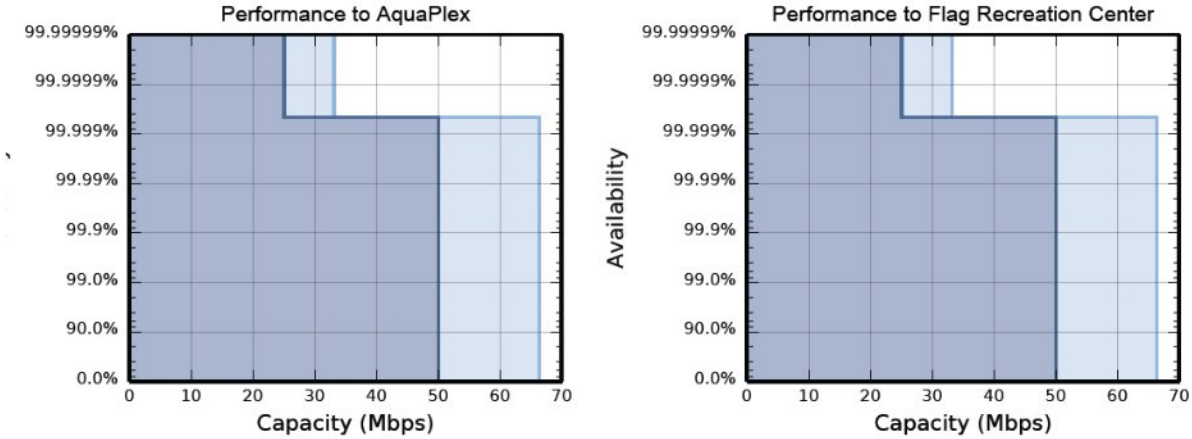
	Performance to AquaPlex	Performance to Flag Recreation Center
Mean IP	50.1 Mbps	50.1 Mbps
IP Availability	99.9995 % for 50.0 Mbps	99.9995 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	0.947 mi.	System Gain	167.81 dB
Band	5.8 GHz	System Gain Margin	56.44 dB
Regulation	United States	Mean Aggregate Data Rate	100.2 Mbps
Modulation	Adaptive	Annual Link Availability	100.0000 %
Bandwidth	10 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	111.37 dB	Prediction Model	ITU-R

Flagstaff Recreation Center is an endpoint user link, receiving traffic from the AquaPlex at 50Mbps. This link is configured for a high reliability unlicensed link, operating in a low interference environment.

Performance Charts



High Capacity, assumes there is no load in the other direction

Symmetrical Capacity, assumes a saturated load in the other direction

Climatic Factors, Losses and Standards

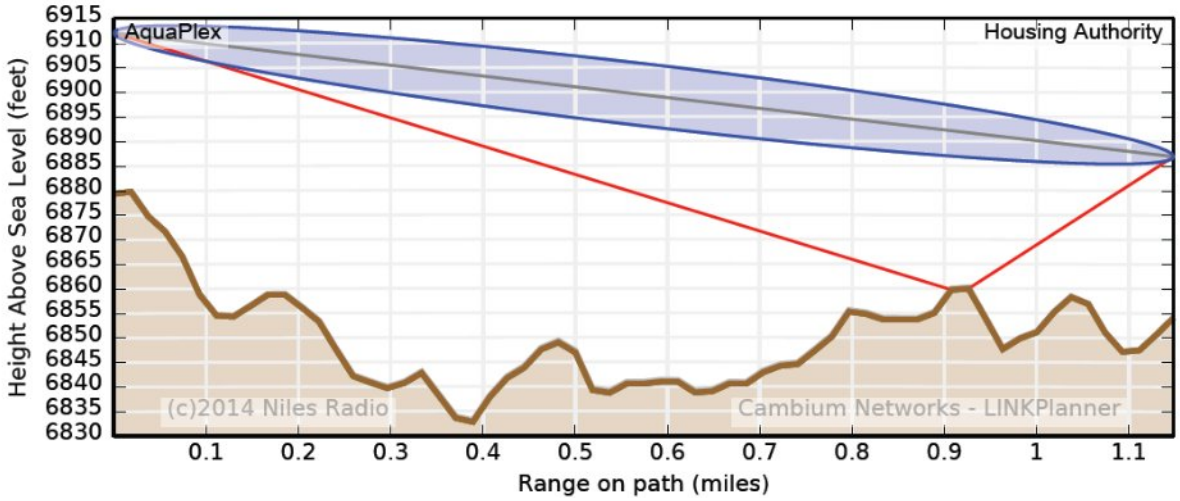
dN/dH not exceeded for 1% of time	-249.76 N units/km	Link Type	Line-of-Sight
Area roughness 110x110km	337.43 metre	Excess Path Loss	0.00 dB
Geoclimatic factor	6.13e-05	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
Fade Occurrence Factor (P0)	7.45e-09	Diffraction Loss	ITU-R P.526-10
Path inclination	7.38 mr	Propagation	ITU-R P.530-12
0.01% Rain rate	30.29 mm/hr	Rain Rate	ITU-R P.837-5
Free Space Path Loss	111.36 dB	Refractivity Index	ITU-R P.453-9
Gaseous Absorption Loss	0.01 dB		

AquaPlex to Housing Authority

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft



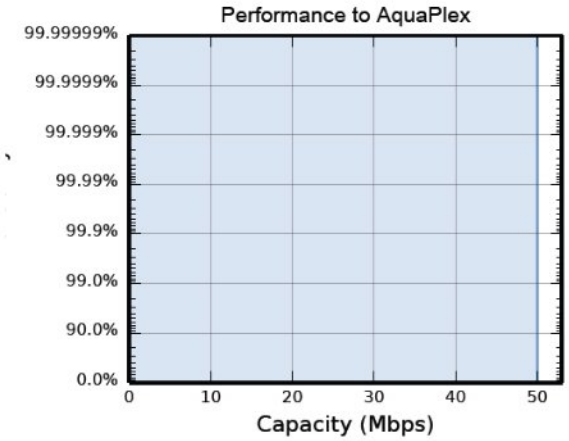
	Performance to AquaPlex	Performance to Housing Authority
Mean IP	50.0 Mbps	50.0 Mbps
IP Availability	100.0000 % for 50.0 Mbps	100.0000 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	1.148 mi.	System Gain	164.20 dB
Band	23 GHz	System Gain Margin	39.20 dB
Regulation	FCC	Mean Aggregate Data Rate	100.0 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	100.0000 %
Bandwidth	10 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	125.00 dB	Prediction Model	ITU-R

This link is a licensed endpoint at 23Ghz, operating at a capacity of 50Mbps, and is expandable up to 100Mbps.

Performance Charts



Climatic Factors, Losses and Standards

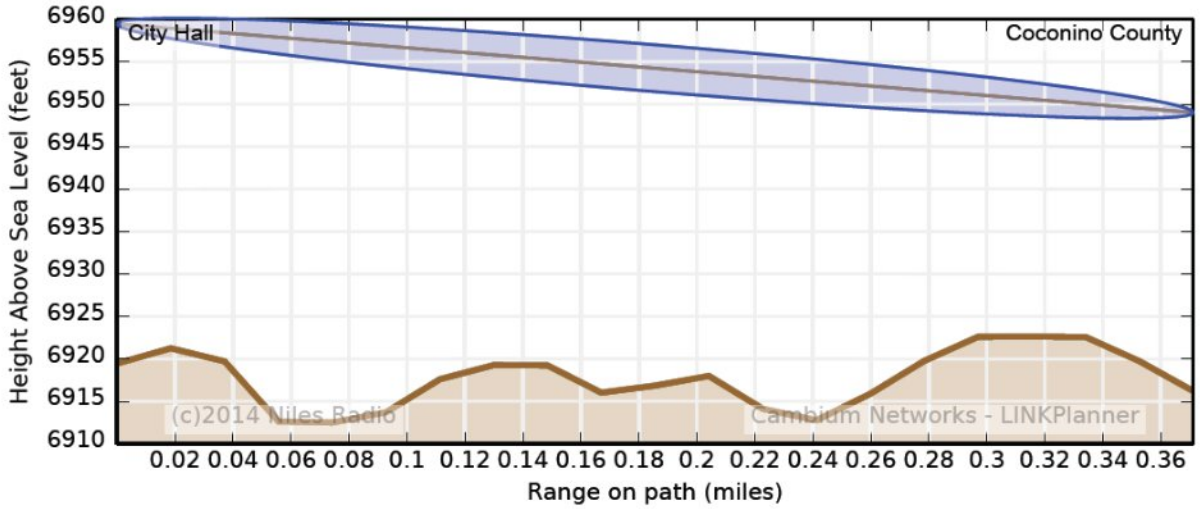
dN/dH not exceeded for 1% of time	-249.64 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	337.51 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.12e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	7.63e-08	Rain Unavailability	0 secs/year
Path inclination	4.16 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.26 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	124.79 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.21 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

City Hall to Coconino County Administration

Equipment: Cambium Networks PTP38800 with ODU-A - 1+0

Cambium Networks 1ft HP Antenna 85010089063 - Direct @ 40 ft

Cambium Networks 1ft HP Antenna 85010089063 - Direct @ 33 ft



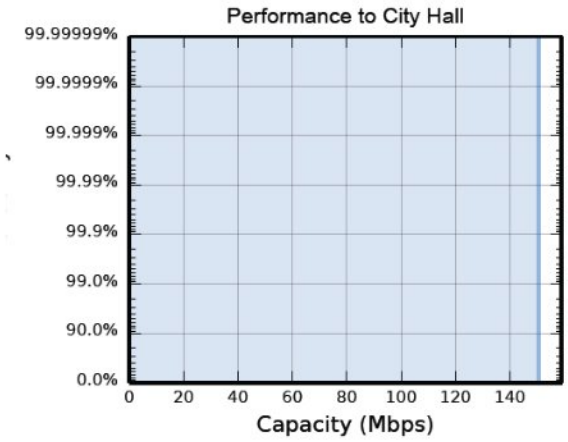
	Performance to City Hall	Performance to Coconino County
Mean IP	150.6 Mbps	150.6 Mbps
IP Availability	100.0000 % for 150.0 Mbps	100.0000 % for 150.0 Mbps

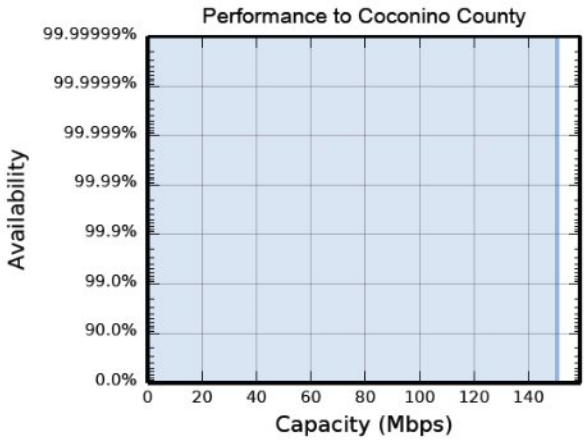
Link Summary

Link Summary			
Link Length	0.371 mi.	System Gain	167.48 dB
Band	38 GHz	System Gain Margin	47.76 dB
Regulation	FCC	Mean Aggregate Data Rate	301.1 Mbps
Modulation	16QAM 0.91 (150.56Mbps)	Annual Link Availability	100.0000 %
Bandwidth	50 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	119.72 dB	Prediction Model	ITU-R

This link is a short haul high capacity 38Ghz link, operating at up to 150Mbps.

Performance Charts





Climatic Factors, Losses and Standards

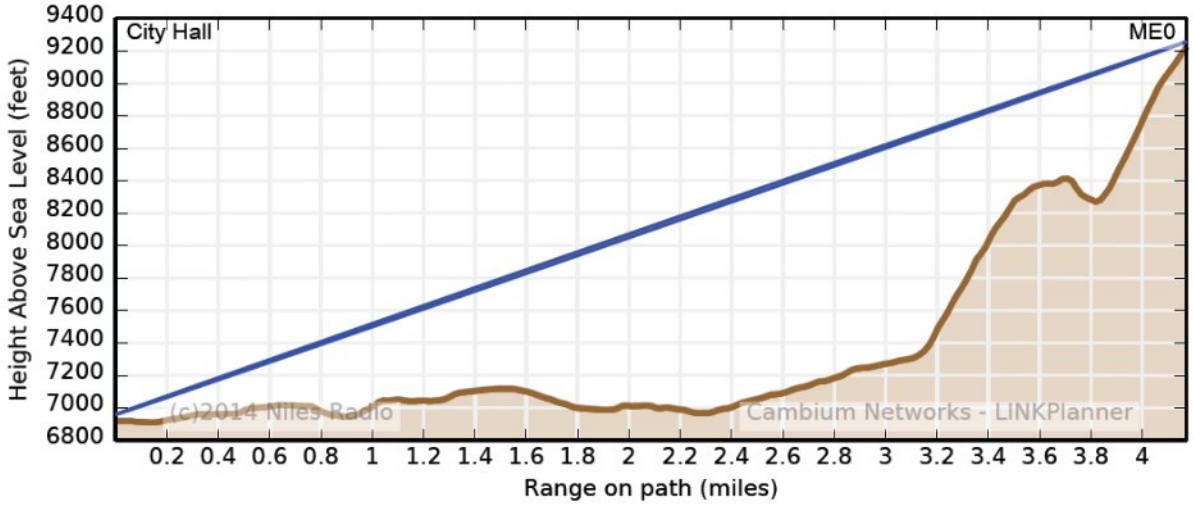
dN/dH not exceeded for 1% of time	-250.24 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	338.54 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	5.33e-09	Rain Unavailability	0 secs/year
Path inclination	5.33 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.42 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	119.68 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.04 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

City Hall to Mt Eldon

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 2ft HP Antenna 85010089043 - Direct @ 40 ft

Cambium Networks 2ft HP Antenna 85010089043 - Direct @ 33 ft



	Performance to City Hall	Performance to ME0
Mean IP	302.2 Mbps	302.2 Mbps
IP Availability	99.9993 % for 100.0 Mbps	99.9993 % for 100.0 Mbps

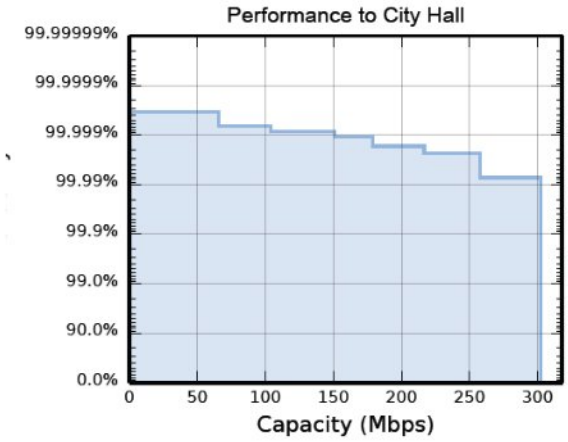
Link Summary

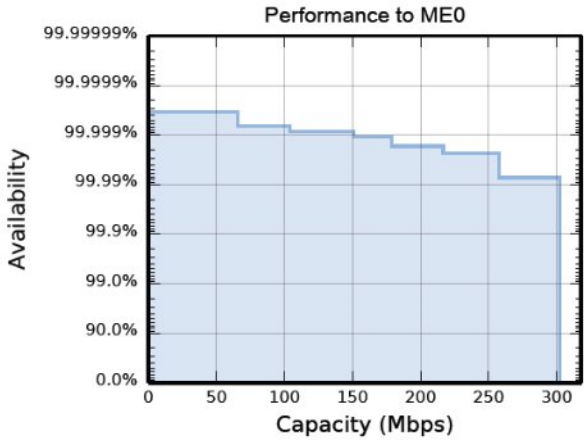
Link Summary			
Link Length	4.173 mi.	System Gain	184.92 dB
Band	23 GHz	System Gain Margin	48.25 dB
Regulation	FCC	Mean Aggregate Data Rate	604.3 Mbps
Modulation	Adaptive	Annual Link Availability	99.9997 %
Bandwidth	50 MHz	Annual Link Unavailability	1.8 mins/year
Total Path Loss	136.67 dB	Prediction Model	ITU-R

This link is the existing City Hall to ME0 link, and will be retained for redundancy, but will not be upgraded. Its function is being replaced with a new link at 600Mbps capacity for City Hall to McMillan Mesa, and a second link at 600Mbps capacity from McMillan Mesa to ME0, to handle the primary traffic load.

Retaining this link will allow a redundant failure mode in the system, and will also allow certain traffic to be routed around the McMillan Mesa facility, increasing useable bandwidth.

Performance Charts





Climatic Factors, Losses and Standards

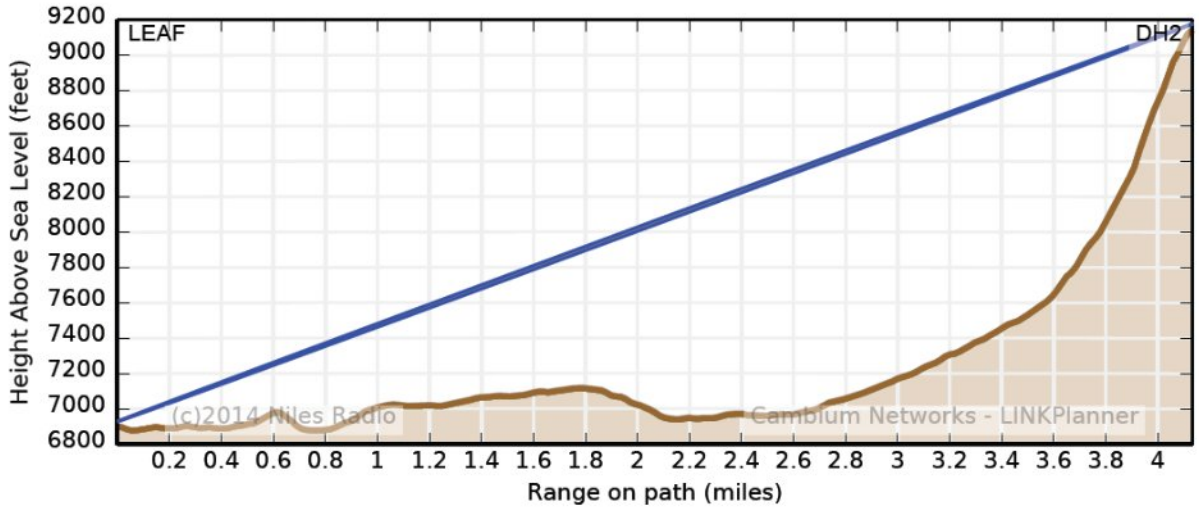
dN/dH not exceeded for 1% of time	-249.58 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	335.39 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	99.9997 %
Fade Occurrence Factor (P0)	2.44e-07	Rain Unavailability	1.8 mins/year
Path inclination	104.31 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.25 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	135.99 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.67 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

LEAF to Devils Head

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 2ft HP Antenna 85010089043 - Direct @ 28 ft

Cambium Networks 2ft HP Antenna 85010089043 - Direct @ 33 ft



	Performance to LEAF	Performance to DH2
Mean IP	50.9 Mbps	50.9 Mbps
IP Availability	99.9992 % for 50.0 Mbps	99.9992 % for 50.0 Mbps

Link Summary

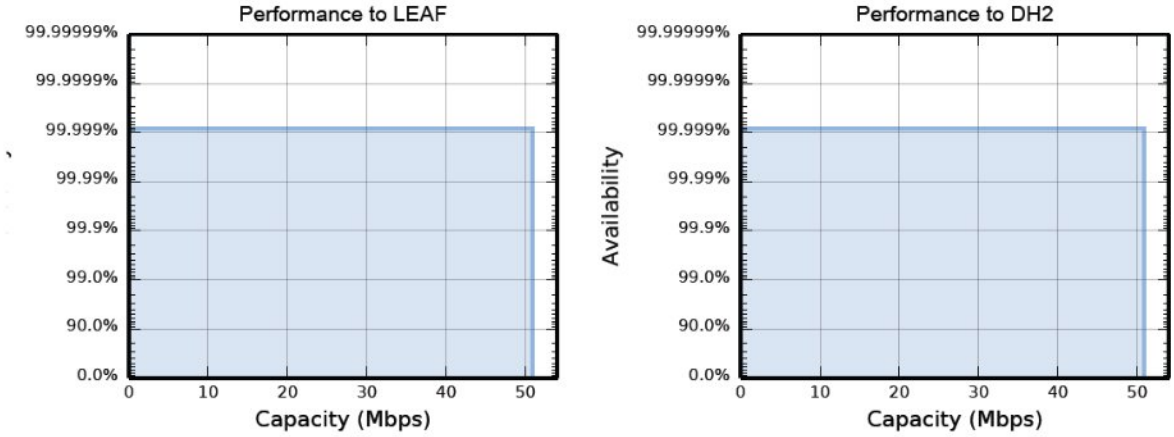
Link Summary			
Link Length	4.134 mi.	System Gain	174.60 dB
Band	23 GHz	System Gain Margin	38.02 dB
Regulation	FCC	Mean Aggregate Data Rate	101.8 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	99.9992 %
Bandwidth	10 MHz	Annual Link Unavailability	4.3 mins/year
Total Path Loss	136.58 dB	Prediction Model	ITU-R

This link is not a part of the IT network upgrade, but is instead a CCSO provided link, that connects the Niles Radio 911 VOIP data network (Sheriffs and Rural Fire) to the Mt Eldon radio systems, and is currently in place. This link allows for an immediate use of the City Accelerator campus to be used as an EOC system, with connectivity to existing radio systems on the 911 VLAN.

This is part of a two link redundant network from the LEAF, to Mt Eldon.

There are no expenses in this project associated with this link.

Performance Charts



Climatic Factors, Losses and Standards

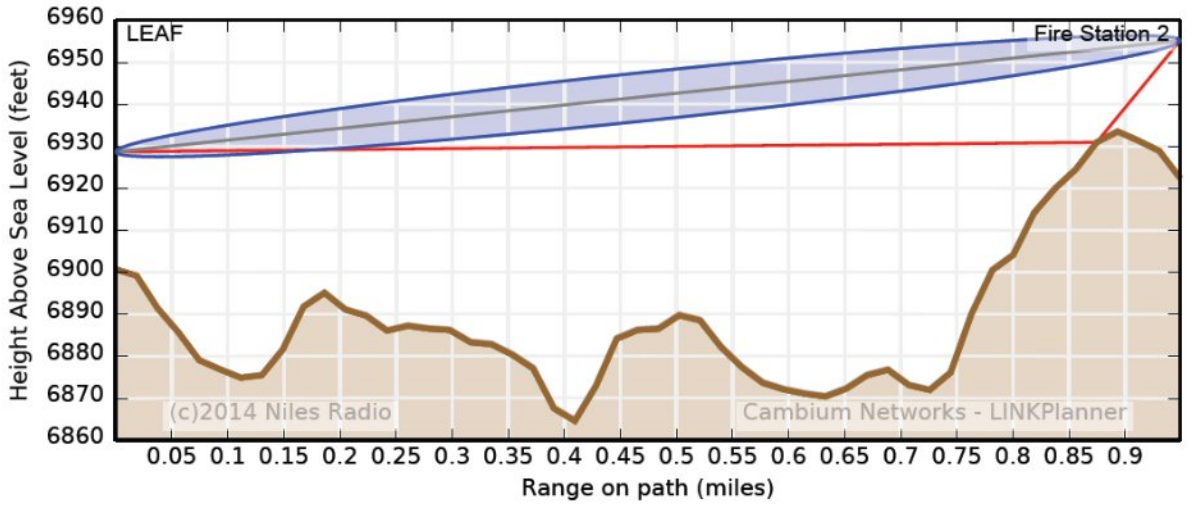
dN/dH not exceeded for 1% of time	-249.70 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	336.30 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	99.9992 %
Fade Occurrence Factor (P0)	2.43e-07	Rain Unavailability	4.3 mins/year
Path inclination	103.11 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.28 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	135.91 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.67 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

LEAF to Fire Station 2

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 28 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft



	Performance to LEAF	Performance to Fire Station 2
Mean IP	50.0 Mbps	50.0 Mbps
IP Availability	100.0000 % for 50.0 Mbps	100.0000 % for 50.0 Mbps

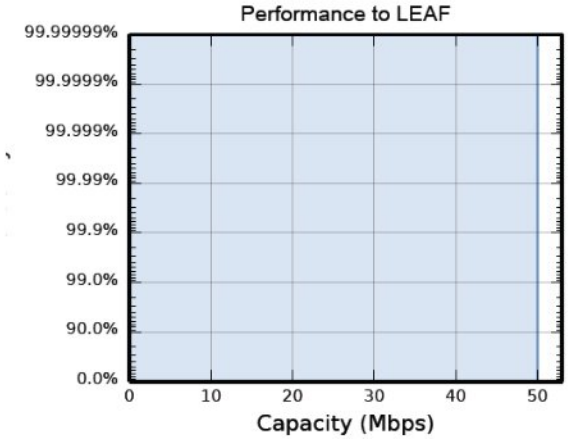
Link Summary

Link Summary			
Link Length	0.949 mi.	System Gain	162.70 dB
Band	23 GHz	System Gain Margin	39.40 dB
Regulation	FCC	Mean Aggregate Data Rate	100.0 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	100.0000 %
Bandwidth	10 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	123.31 dB	Prediction Model	ITU-R

Fire Station 2 is situated in such a location that the only reachable segment is to the LEAF. The IT network includes a high capacity link from Mt Eldon that connects the LEAF to the IT network and later for EOC operations at the Accelerator facility, and is also used to relay traffic to Fire Station 2.

The configured capacity of this link is 50Mbps.

Performance Charts



Climatic Factors, Losses and Standards

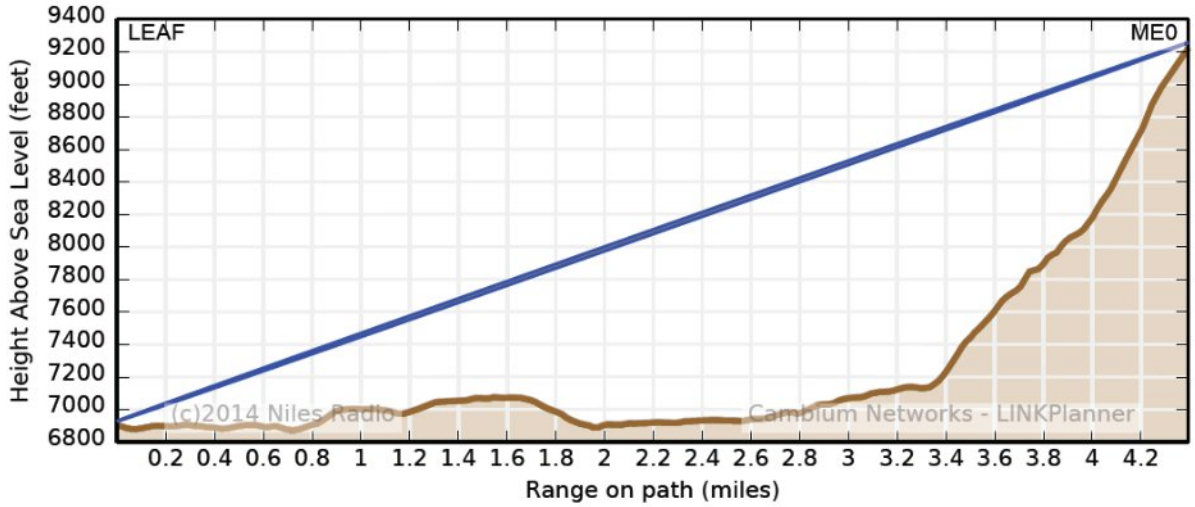
dN/dH not exceeded for 1% of time	-250.30 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	340.10 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	3.34e-08	Rain Unavailability	0 secs/year
Path inclination	5.29 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.44 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	123.13 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.17 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

LEAF to Mt. Eldon

Equipment: Cambium Networks PTP18800 with ODU-B - 1+0

Cambium Networks 3ft HP Antenna 85009298006 - Direct @ 28 ft

Cambium Networks 3ft HP Antenna 85009298006 - Direct @ 33 ft



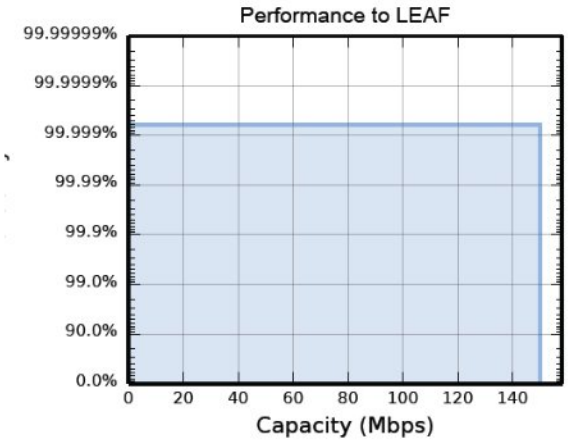
	Performance to LEAF	Performance to ME0
Mean IP	150.0 Mbps	150.0 Mbps
IP Availability	99.9994 % for 150.0 Mbps	99.9994 % for 150.0 Mbps

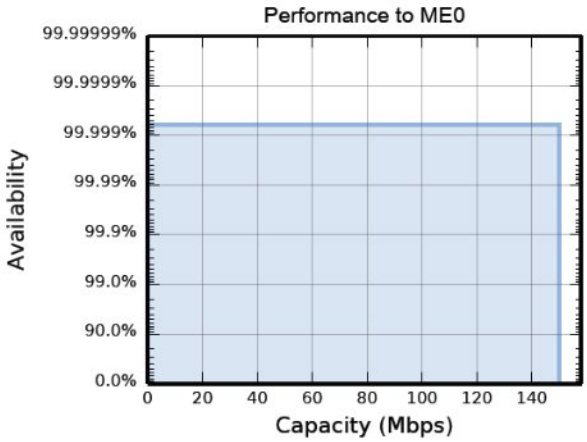
Link Summary

Link Summary			
Link Length	4.394 mi.	System Gain	167.91 dB
Band	18 GHz	System Gain Margin	32.83 dB
Regulation	FCC	Mean Aggregate Data Rate	300.0 Mbps
Modulation	256QAM 0.80 (177.44Mbps)	Annual Link Availability	99.9994 %
Bandwidth	30 MHz	Annual Link Unavailability	3.2 mins/year
Total Path Loss	135.09 dB	Prediction Model	ITU-R

This link connects the LEAF and Fire Station 2 facilities, to the IT network, and is also be used to connect the LEAF to the EOC facilities at the Business Accelerator Facility.
The configured capacity of this link is 150Mbps

Performance Charts





Climatic Factors, Losses and Standards

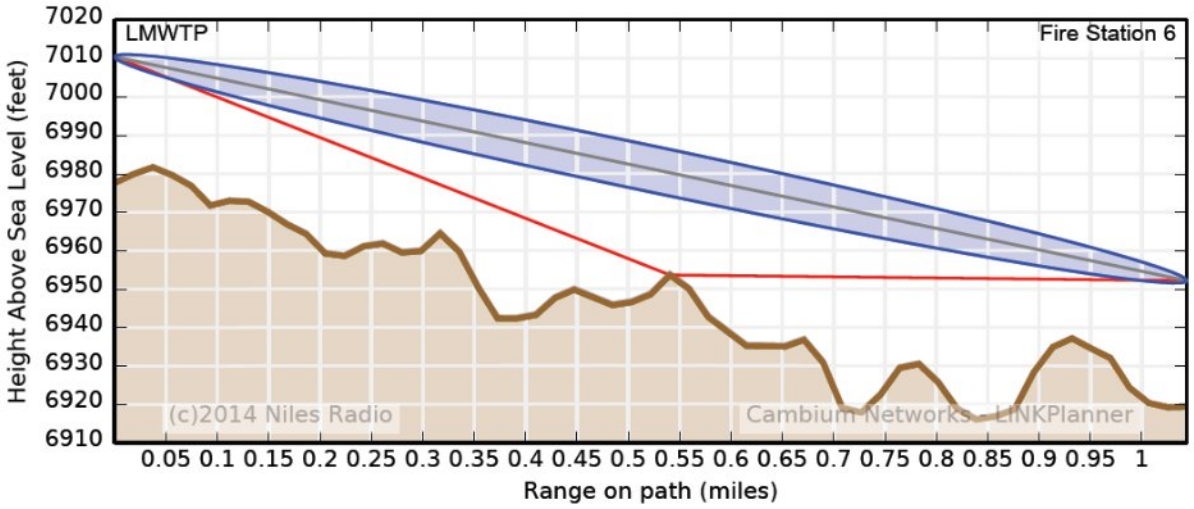
dN/dH not exceeded for 1% of time	-249.68 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	336.55 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	99.9994 %
Fade Occurrence Factor (P0)	2.31e-07	Rain Unavailability	3.2 mins/year
Path inclination	100.37 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.27 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	134.88 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.21 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Lake Mary Water Treatment Plant to Fire Station 6

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft



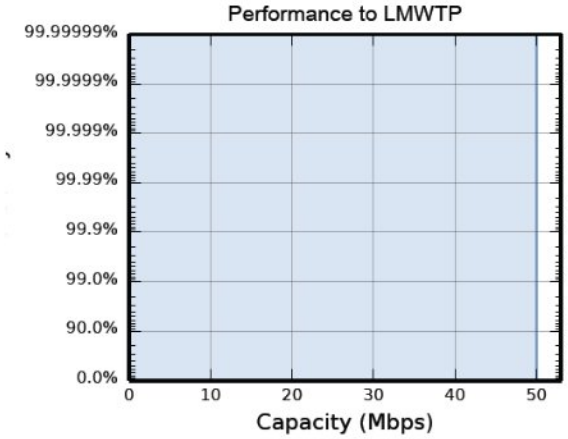
	Performance to LMWTP	Performance to Fire Station 6
Mean IP	50.0 Mbps	50.0 Mbps
IP Availability	100.0000 % for 50.0 Mbps	100.0000 % for 50.0 Mbps

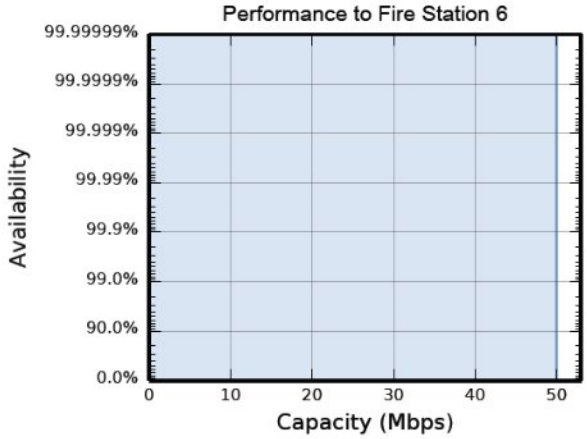
Link Summary

Link Summary			
Link Length	1.044 mi.	System Gain	163.70 dB
Band	23 GHz	System Gain Margin	39.55 dB
Regulation	FCC	Mean Aggregate Data Rate	100.0 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	100.0000 %
Bandwidth	10 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	124.15 dB	Prediction Model	ITU-R

This link uses the existing link that already connects to the IT network at Lake Mary Water Treatment Plant to Mt Eldon.
This path is configured for 50Mbps capacity.

Performance Charts





Climatic Factors, Losses and Standards

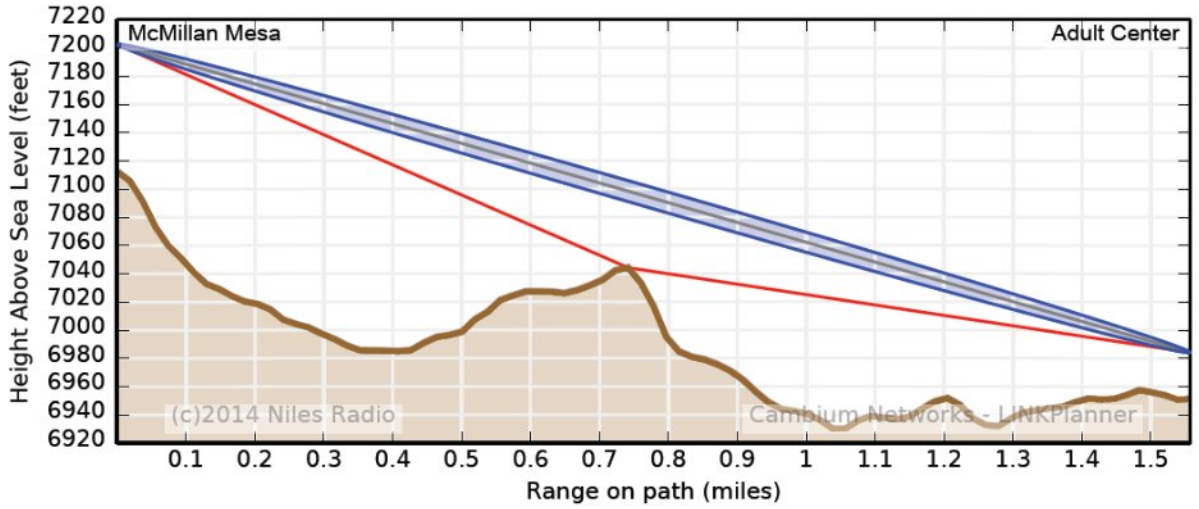
dN/dH not exceeded for 1% of time	-251.37 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	346.26 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	2.47e-08	Rain Unavailability	0 secs/year
Path inclination	10.57 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.70 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	123.96 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.19 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to Adult Center

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 90 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft



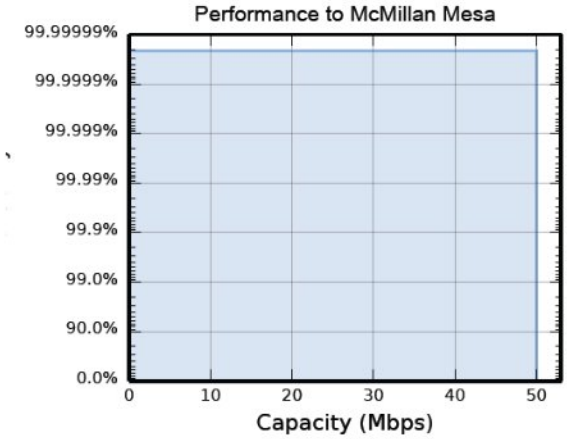
	Performance to McMillan Mesa	Performance to Adult Center
Mean IP	50.0 Mbps	50.0 Mbps
IP Availability	100.0000 % for 50.0 Mbps	100.0000 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	1.557 mi.	System Gain	164.20 dB
Band	23 GHz	System Gain Margin	36.49 dB
Regulation	FCC	Mean Aggregate Data Rate	100.0 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	100.0000 %
Bandwidth	10 MHz	Annual Link Unavailability	7 secs/year
Total Path Loss	127.71 dB	Prediction Model	ITU-R

This link connects the Adult Center to the McMillan Mesa facility.
It is configured for 50Mbps capacity.

Performance Charts



Climatic Factors, Losses and Standards

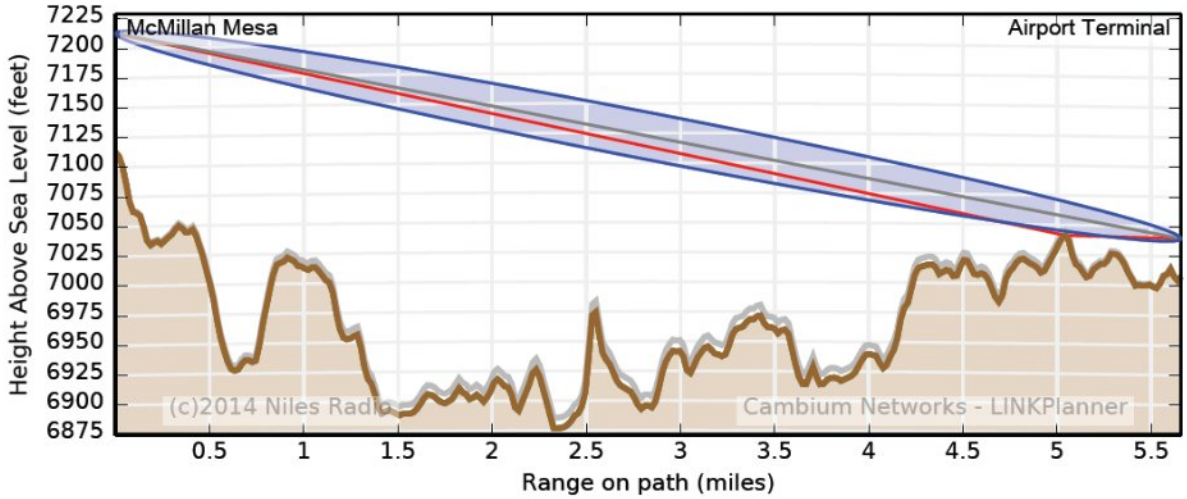
dN/dH not exceeded for 1% of time	-249.99 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	336.85 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	3.76e-08	Rain Unavailability	7 secs/year
Path inclination	26.57 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.36 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	127.43 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.28 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to Airport Terminal

Equipment: Cambium Networks PTP11800 with ODU-B - 1+0

Cambium Networks 4ft HP Antenna 85010089052 - Direct @ 100 ft

Cambium Networks 4ft HP Antenna 85010089052 - Direct @ 32 ft

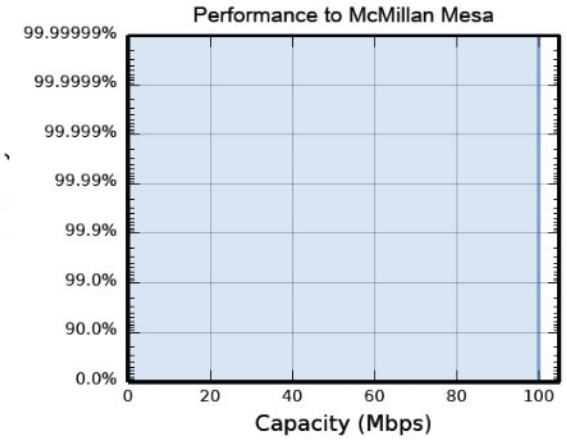


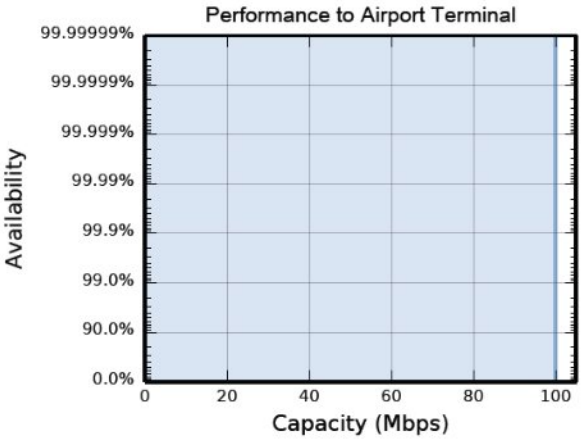
	Performance to McMillan Mesa	Performance to Airport Terminal
Mean IP	100.0 Mbps	100.0 Mbps
IP Availability	100.0000 % for 100.0 Mbps	100.0000 % for 100.0 Mbps

Link Summary

Link Summary			
Link Length	5.658 mi.	System Gain	171.09 dB
Band	11 GHz	System Gain Margin	38.39 dB
Regulation	FCC	Mean Aggregate Data Rate	200.0 Mbps
Modulation	64QAM 0.88 (135.98Mbps)	Annual Link Availability	100.0000 %
Bandwidth	30 MHz	Annual Link Unavailability	1 secs/year
Total Path Loss	132.70 dB	Prediction Model	ITU-R

Performance Charts





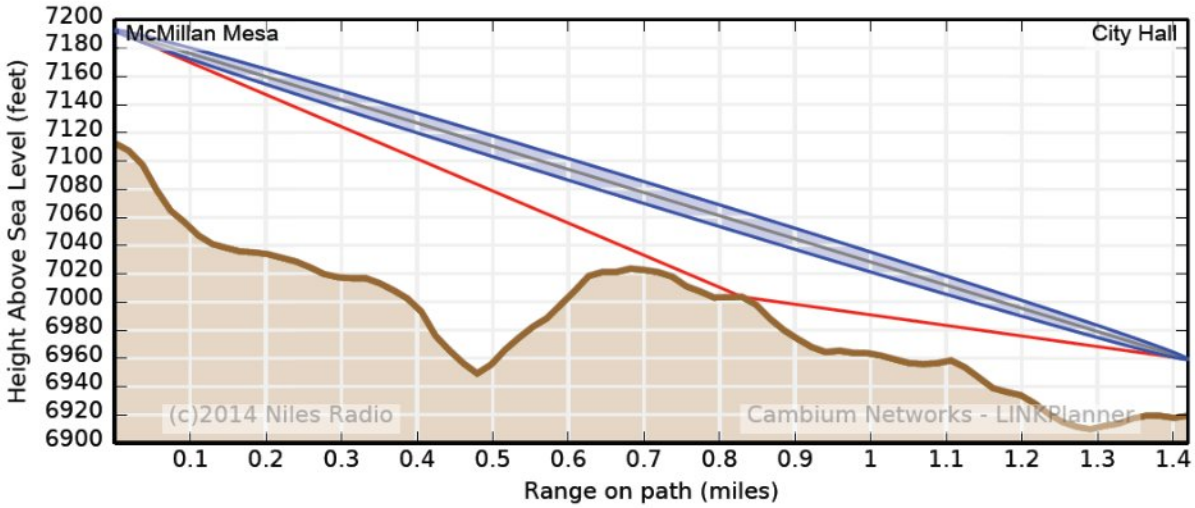
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-250.83 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	342.56 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	3.86e-06	Rain Unavailability	1 secs/year
Path inclination	5.78 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.57 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	132.62 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.08 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to City Hall

Equipment: Cambium Networks PTP18820S - 1+0

Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct @ 80 ft

Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct @ 40 ft

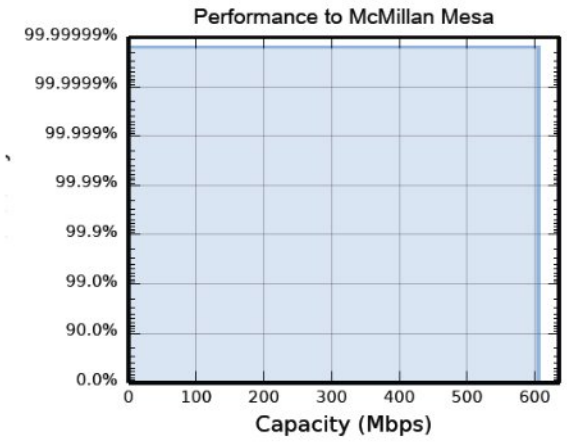


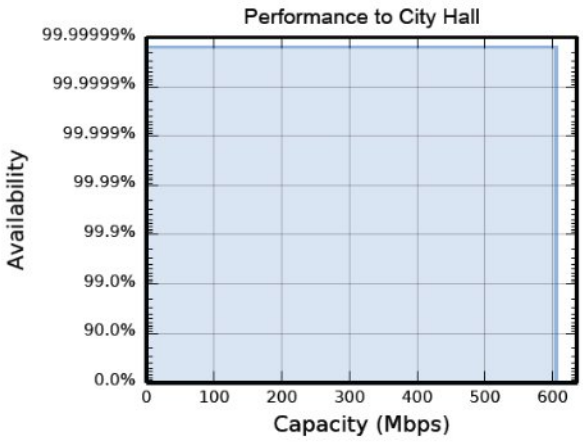
	Performance to McMillan Mesa	Performance to City Hall
Mean IP	605.3 Mbps	605.3 Mbps
IP Availability	100.0000 % for 605.0 Mbps	100.0000 % for 605.0 Mbps

Link Summary

Link Summary			
Link Length	1.420 mi.	System Gain Margin	26.56 dB
Band	18 GHz	Mean Aggregate Data Rate	1210.5 Mbps
Regulation	FCC	Annual Link Availability	100.0000 %
Modulation	8 - 1024QAM	Annual Link Unavailability	5 secs/year
Bandwidth	80 MHz	Frame Size	1518 Bytes
Total Path Loss	125.14 dB	Prediction Model	ITU-R
System Gain	151.70 dB		

Performance Charts





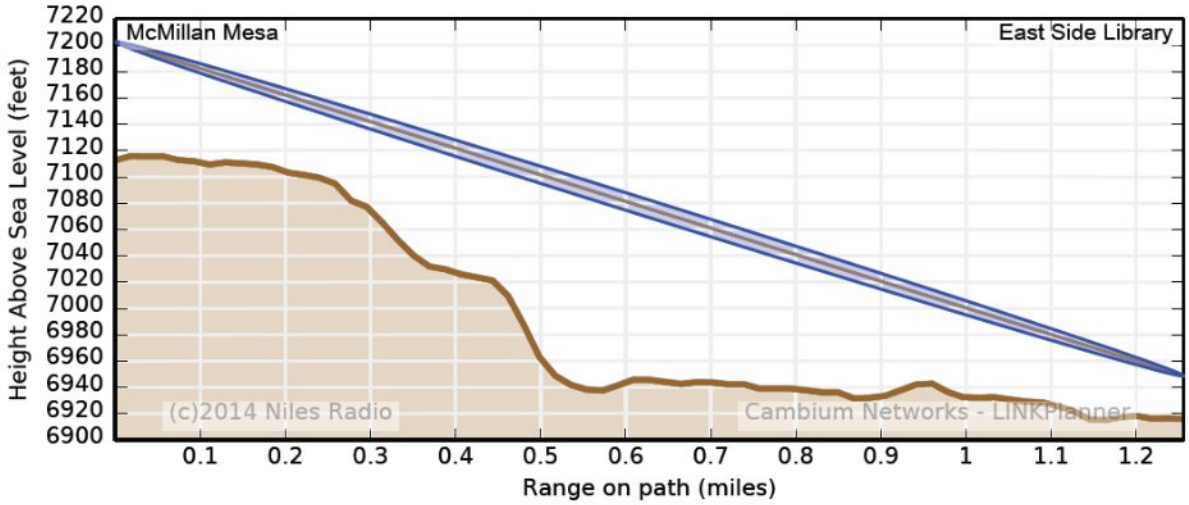
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-250.01 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	337.28 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	1.86e-08	Rain Unavailability	5 secs/year
Path inclination	31.11 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.36 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	125.06 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.08 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to East Side Library

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 90 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

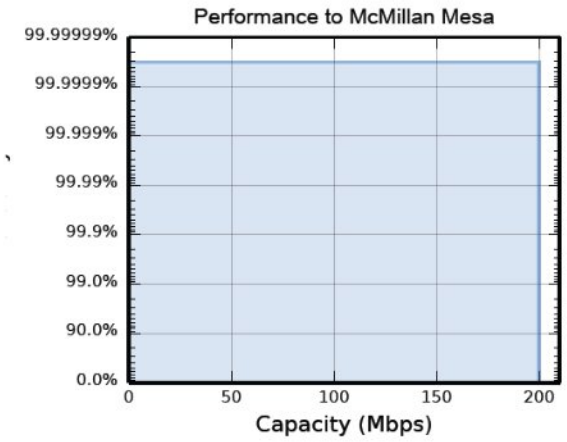


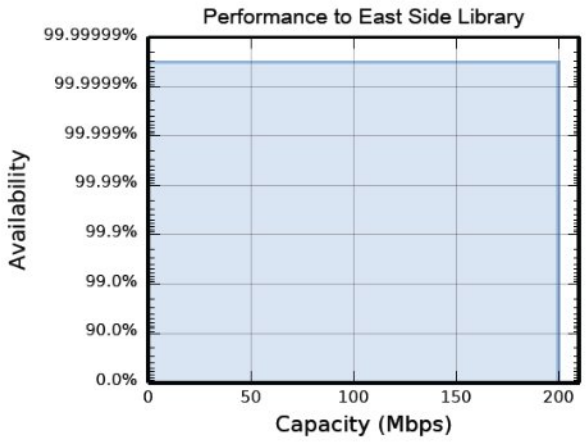
	Performance to McMillan Mesa	Performance to East Side Library
Mean IP	200.0 Mbps	200.0 Mbps
IP Availability	100.0000 % for 200.0 Mbps	100.0000 % for 200.0 Mbps

Link Summary

Link Summary			
Link Length	1.256 mi.	System Gain	153.99 dB
Band	23 GHz	System Gain Margin	28.20 dB
Regulation	FCC	Mean Aggregate Data Rate	400.0 Mbps
Modulation	256QAM 0.80 (236.61Mbps)	Annual Link Availability	100.0000 %
Bandwidth	40 MHz	Annual Link Unavailability	10 secs/year
Total Path Loss	125.79 dB	Prediction Model	ITU-R

Performance Charts





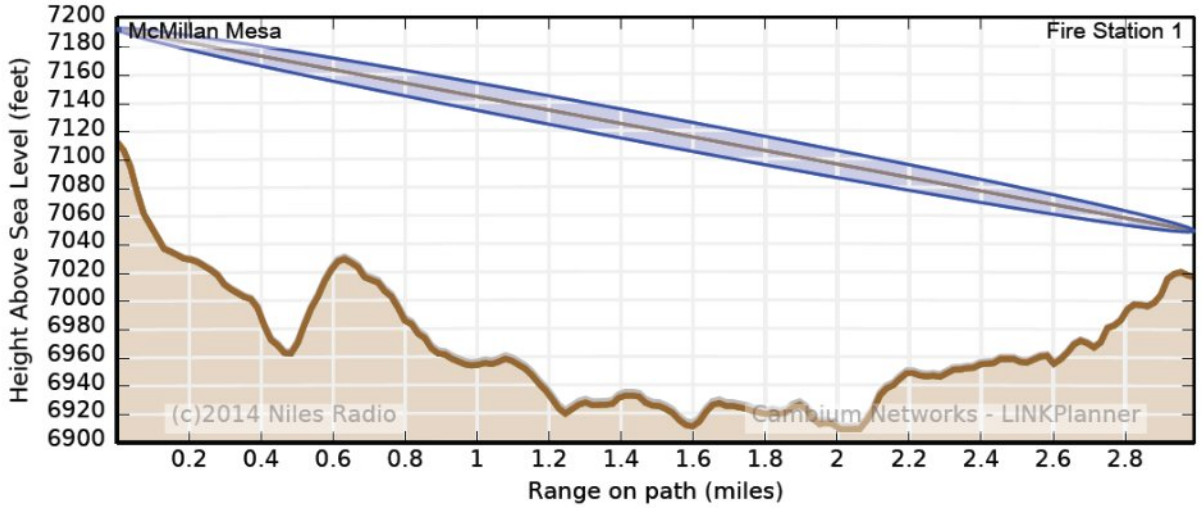
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-249.66 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	336.09 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	1.37e-08	Rain Unavailability	10 secs/year
Path inclination	38.29 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.27 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	125.56 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.23 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to Fire Station 1

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 80 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

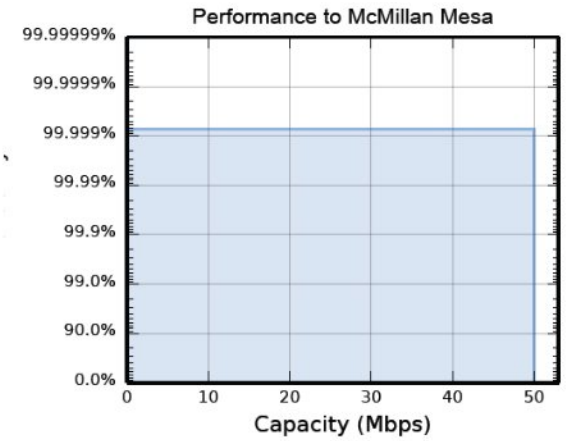


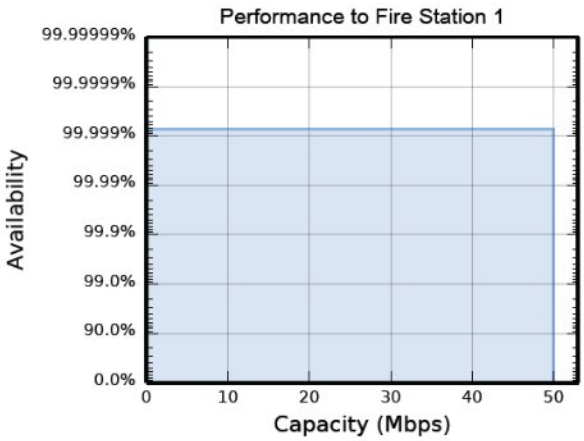
	Performance to McMillan Mesa	Performance to Fire Station 1
Mean IP	50.0 Mbps	50.0 Mbps
IP Availability	99.9993 % for 50.0 Mbps	99.9993 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	2.992 mi.	System Gain	164.20 dB
Band	23 GHz	System Gain Margin	30.56 dB
Regulation	FCC	Mean Aggregate Data Rate	100.0 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	99.9993 %
Bandwidth	10 MHz	Annual Link Unavailability	3.8 mins/year
Total Path Loss	133.64 dB	Prediction Model	ITU-R

Performance Charts





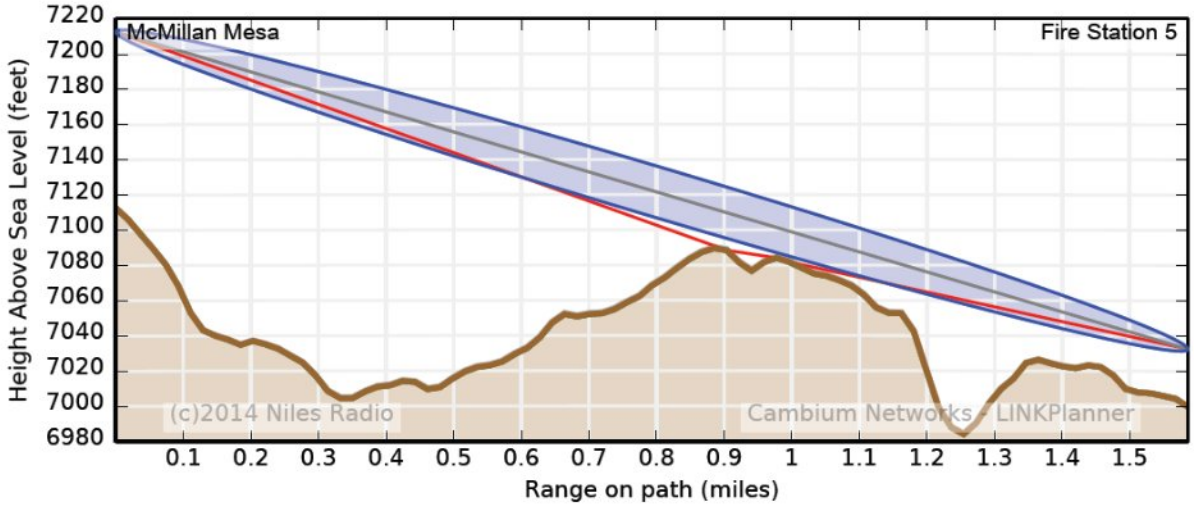
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-250.26 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	338.28 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	99.9993 %
Fade Occurrence Factor (P0)	7.79e-07	Rain Unavailability	3.8 mins/year
Path inclination	9.04 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.42 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	133.11 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.54 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to Fire Station 5

Equipment: Cambium Networks PTP650 Full Connectorized

Cambium Networks 2ft Dual-Polar Parabolic
RDH4503 @ 100 ft

Cambium Networks 2ft Dual-Polar Parabolic
RDH4503 @ 33 ft

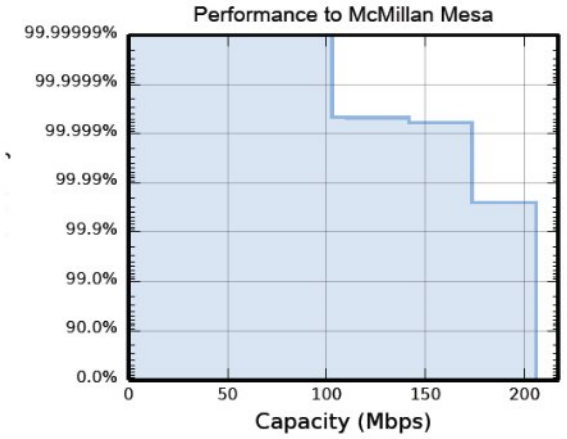


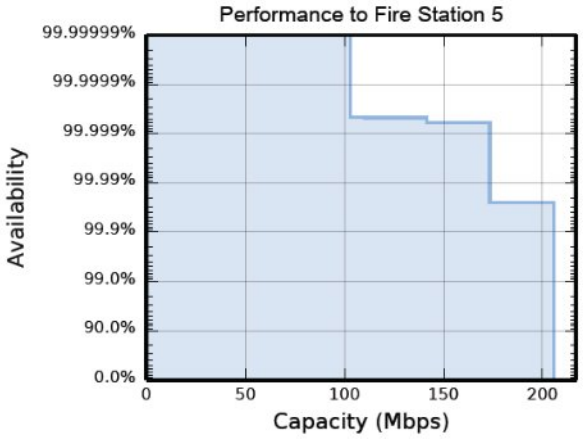
	Performance to McMillan Mesa	Performance to Fire Station 5
Mean IP	205.7 Mbps	205.7 Mbps
IP Availability	100.0000 % for 50.0 Mbps	100.0000 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	1.586 mi.	System Gain	150.86 dB
Band	5.8 GHz	System Gain Margin	35.01 dB
Regulation	United States	Mean Aggregate Data Rate	411.4 Mbps
Modulation	Adaptive	Annual Link Availability	100.0000 %
Bandwidth	40 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	115.85 dB	Prediction Model	ITU-R

Performance Charts





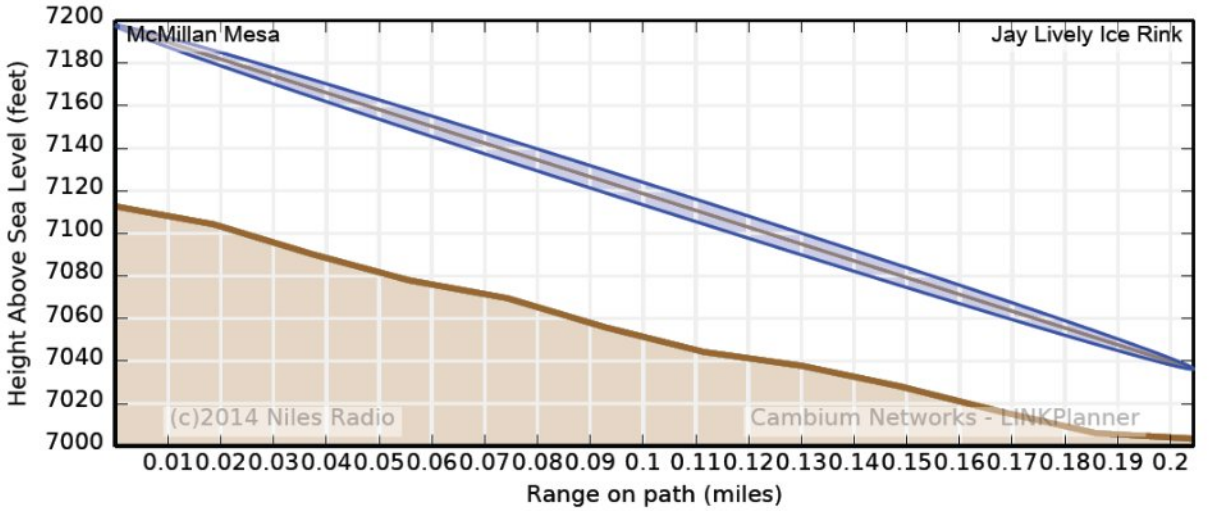
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-249.71 N units/km	Link Type	Line-of-Sight
Area roughness 110x110km	334.73 metre	Excess Path Loss	0.00 dB
Geoclimatic factor	6.15e-05	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
Fade Occurrence Factor (P0)	1.39e-08	Diffraction Loss	ITU-R P.526-10
Path inclination	21.51 mr	Propagation	ITU-R P.530-12
0.01% Rain rate	30.28 mm/hr	Rain Rate	ITU-R P.837-5
Free Space Path Loss	115.84 dB	Refractivity Index	ITU-R P.453-9
Gaseous Absorption Loss	0.01 dB		

McMillan Mesa to Jay Lively Ice Rink

Equipment: Cambium Networks PTP650 Full Integrated

Cambium Networks Integrated Dual Polar Antenna @ 85 ft

Cambium Networks Integrated Dual Polar Antenna @ 33 ft

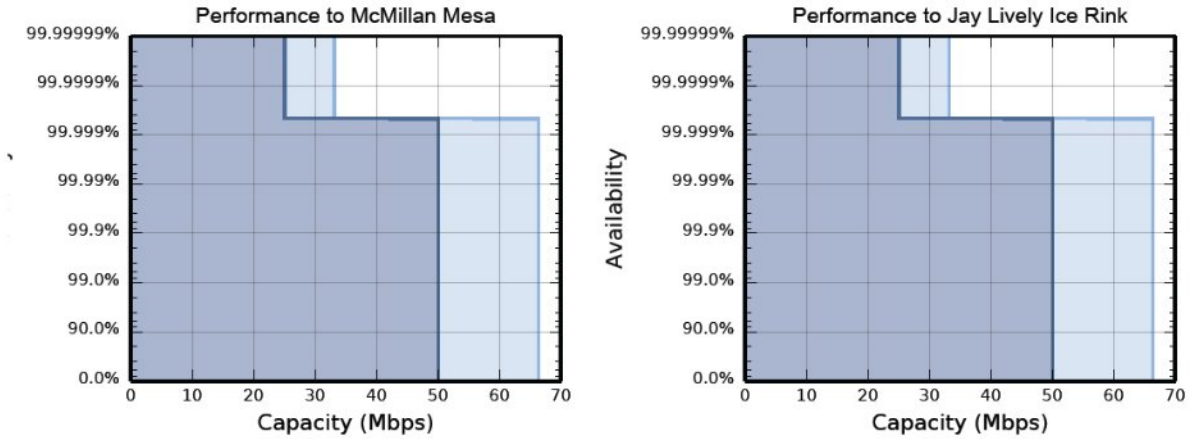


	Performance to McMillan Mesa	Performance to Jay Lively Ice Rink
Mean IP	50.1 Mbps	50.1 Mbps
IP Availability	99.9995 % for 50.0 Mbps	99.9995 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	0.204 mi.	System Gain	139.92 dB
Band	5.8 GHz	System Gain Margin	41.88 dB
Regulation	United States	Mean Aggregate Data Rate	100.2 Mbps
Modulation	Adaptive	Annual Link Availability	100.0000 %
Bandwidth	10 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	98.04 dB	Prediction Model	ITU-R

Performance Charts



High Capacity, assumes there is no load in the other direction

Symmetrical Capacity, assumes a saturated load in the other direction

Climatic Factors, Losses and Standards

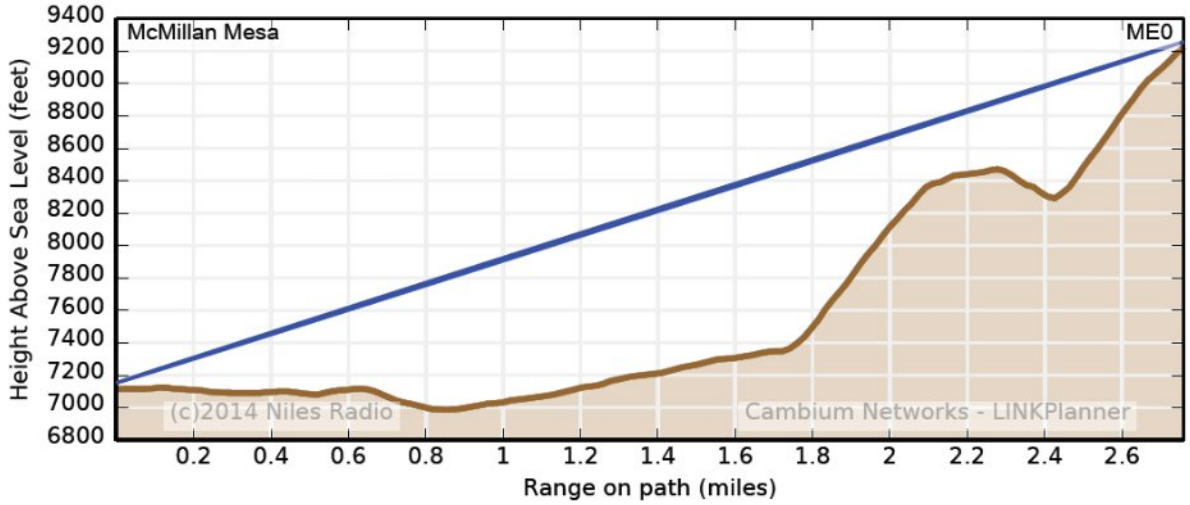
dN/dH not exceeded for 1% of time	-249.79 N units/km	Link Type	Line-of-Sight
Area roughness 110x110km	336.06 metre	Excess Path Loss	0.00 dB
Geoclimatic factor	6.14e-05	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
Fade Occurrence Factor (P0)	3.11e-12	Diffraction Loss	ITU-R P.526-10
Path inclination	149.57 mr	Propagation	ITU-R P.530-12
0.01% Rain rate	30.30 mm/hr	Rain Rate	ITU-R P.837-5
Free Space Path Loss	98.04 dB	Refractivity Index	ITU-R P.453-9
Gaseous Absorption Loss	0.00 dB		

McMillan Mesa to Mt Eldon

Equipment: Cambium Networks PTP18820S - 1+0

Cambium Networks 4ft Single Pol (NA & CALA Only) N180082D054 - Direct @ 40 ft

Cambium Networks 4ft Single Pol (NA & CALA Only) N180082D054 - Direct @ 33 ft

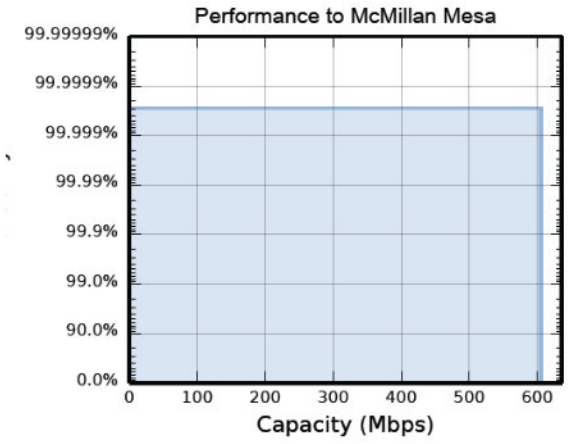


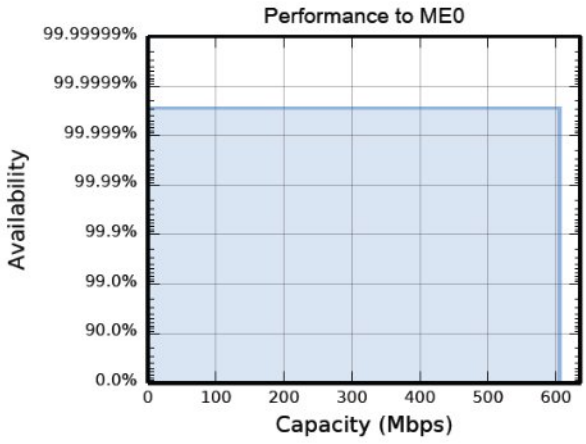
	Performance to McMillan Mesa	Performance to ME0
Mean IP	605.3 Mbps	605.3 Mbps
IP Availability	99.9997 % for 605.0 Mbps	99.9997 % for 605.0 Mbps

Link Summary

Link Summary			
Link Length	2.759 mi.	System Gain Margin	27.54 dB
Band	18 GHz	Mean Aggregate Data Rate	1210.5 Mbps
Regulation	FCC	Annual Link Availability	99.9997 %
Modulation	8 - 1024QAM	Annual Link Unavailability	1.5 mins/year
Bandwidth	80 MHz	Frame Size	1518 Bytes
Total Path Loss	130.96 dB	Prediction Model	ITU-R
System Gain	158.50 dB		

Performance Charts





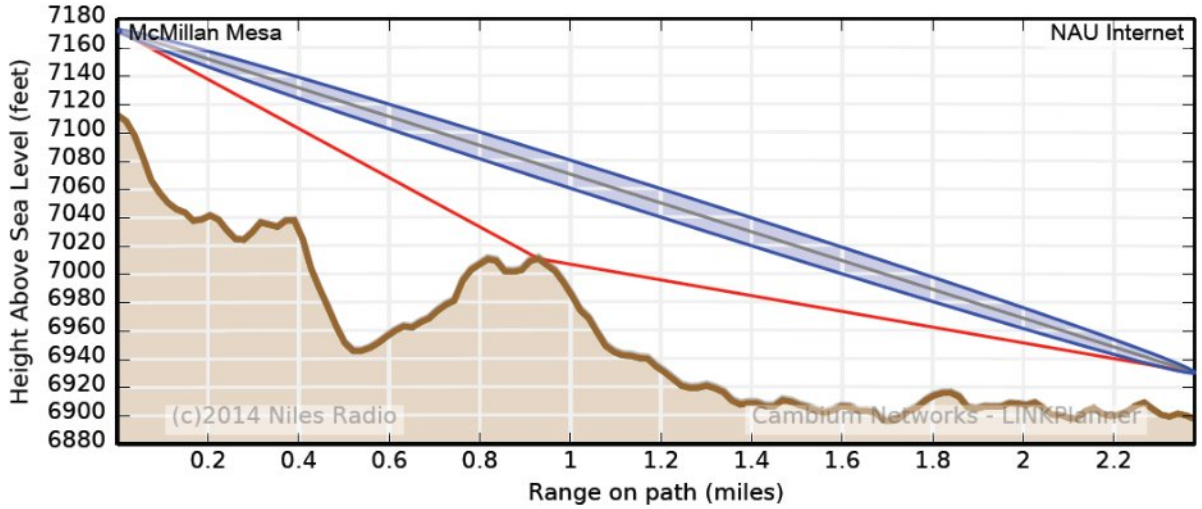
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-249.35 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	334.28 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	99.9997 %
Fade Occurrence Factor (P0)	3.22e-08	Rain Unavailability	1.5 mins/year
Path inclination	144.46 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.18 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	130.83 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.13 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to NAU Internet

Equipment: Cambium Networks PTP18800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089057 - Direct @ 60 ft

Cambium Networks 1ft HP Antenna 85010089057 - Direct @ 33 ft

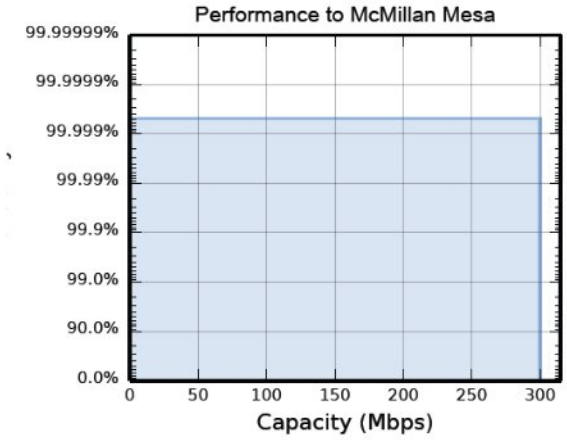


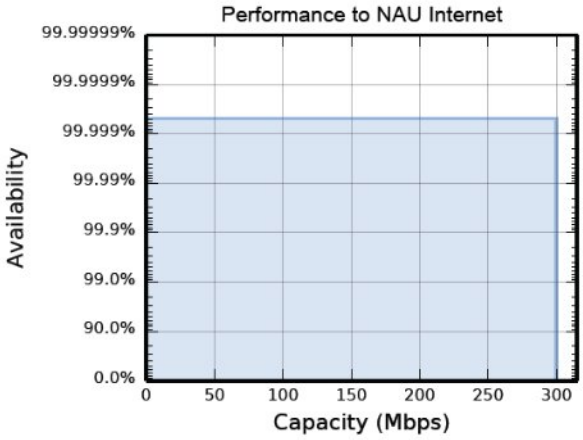
	Performance to McMillan Mesa	Performance to NAU Internet
Mean IP	300.0 Mbps	300.0 Mbps
IP Availability	99.9995 % for 300.0 Mbps	99.9995 % for 300.0 Mbps

Link Summary

Link Summary			
Link Length	2.378 mi.	System Gain	150.98 dB
Band	18 GHz	System Gain Margin	21.31 dB
Regulation	FCC	Mean Aggregate Data Rate	600.0 Mbps
Modulation	256QAM 0.83 (302.16Mbps)	Annual Link Availability	99.9995 %
Bandwidth	50 MHz	Annual Link Unavailability	2.6 mins/year
Total Path Loss	129.68 dB	Prediction Model	ITU-R

Performance Charts





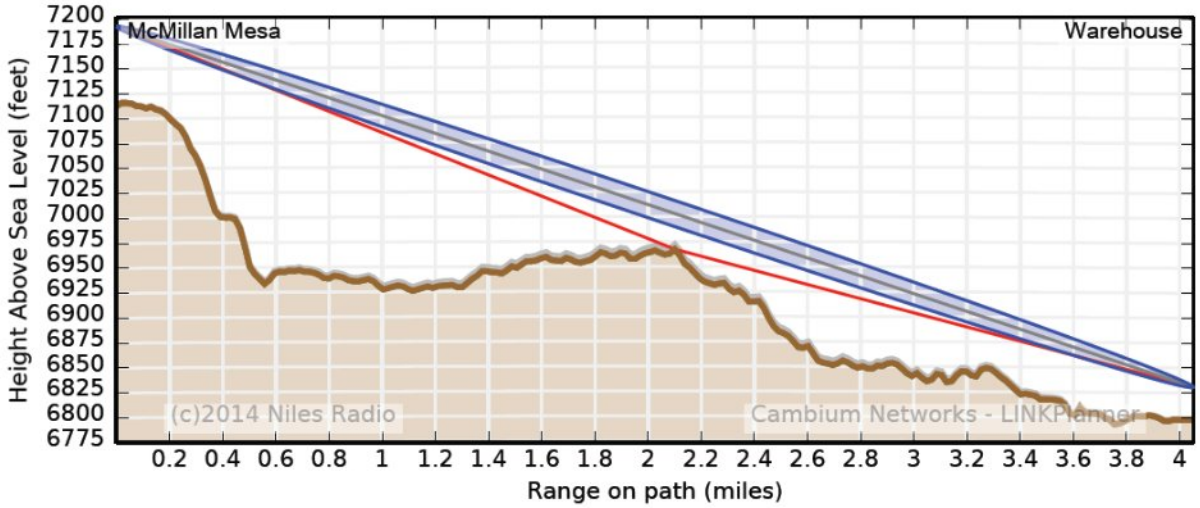
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-250.20 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	338.47 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.14e-05	Rain Availability	99.9995 %
Fade Occurrence Factor (P0)	1.54e-07	Rain Unavailability	2.6 mins/year
Path inclination	19.28 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.41 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	129.54 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.13 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

McMillan Mesa to Warehouse

Equipment: Cambium Networks PTP18800 with ODU-B - 1+0

Cambium Networks 2ft HP Antenna 85010089042 - Direct @ 80 ft

Cambium Networks 2ft HP Antenna 85010089042 - Direct @ 33 ft

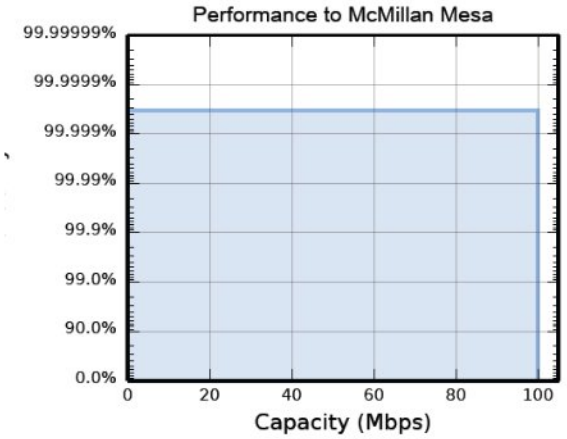


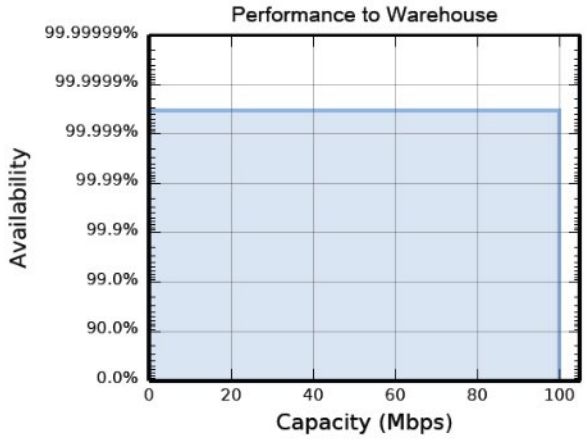
	Performance to McMillan Mesa	Performance to Warehouse
Mean IP	100.0 Mbps	100.0 Mbps
IP Availability	99.9997 % for 100.0 Mbps	99.9997 % for 100.0 Mbps

Link Summary

Link Summary			
Link Length	4.052 mi.	System Gain	170.29 dB
Band	18 GHz	System Gain Margin	35.89 dB
Regulation	FCC	Mean Aggregate Data Rate	200.0 Mbps
Modulation	64QAM 0.88 (135.98Mbps)	Annual Link Availability	99.9997 %
Bandwidth	30 MHz	Annual Link Unavailability	1.8 mins/year
Total Path Loss	134.40 dB	Prediction Model	ITU-R

Performance Charts





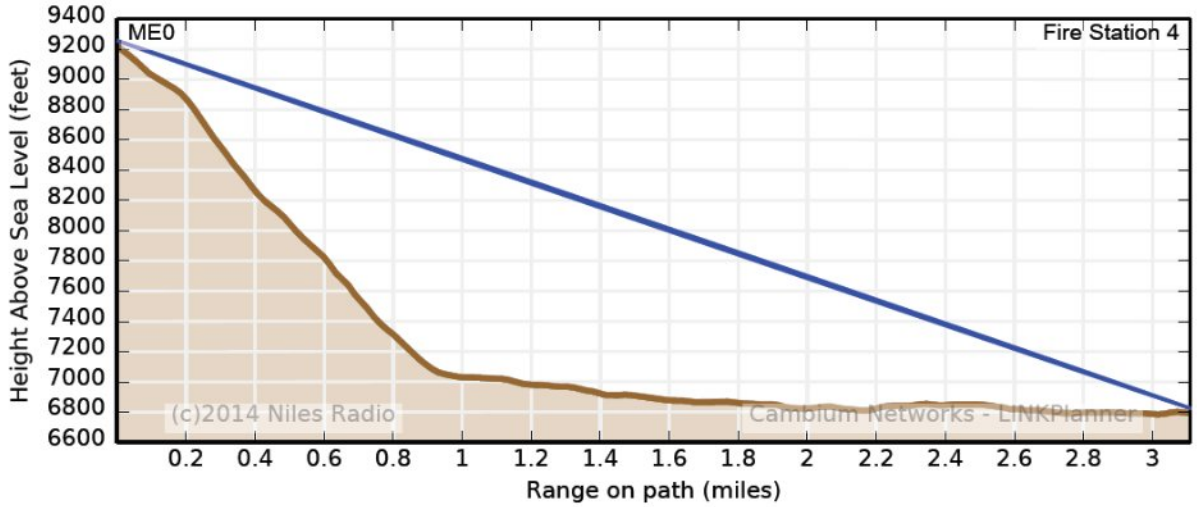
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-249.39 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	335.79 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	99.9997 %
Fade Occurrence Factor (P0)	1.01e-06	Rain Unavailability	1.8 mins/year
Path inclination	16.92 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.19 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	134.17 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.23 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Mt Eldon to Fire Station 4

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 33 ft

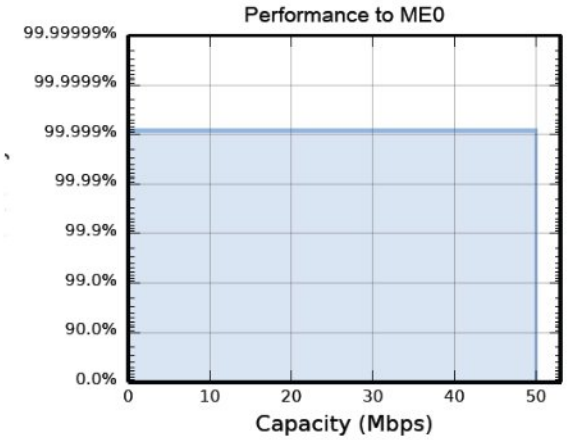


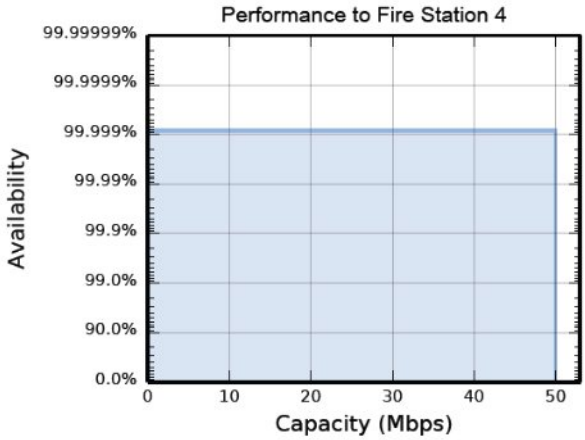
	Performance to ME0	Performance to Fire Station 4
Mean IP	50.0 Mbps	50.0 Mbps
IP Availability	99.9992 % for 50.0 Mbps	99.9992 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	3.110 mi.	System Gain	164.20 dB
Band	23 GHz	System Gain Margin	30.26 dB
Regulation	FCC	Mean Aggregate Data Rate	100.0 Mbps
Modulation	128QAM 0.83 (50.88Mbps)	Annual Link Availability	99.9992 %
Bandwidth	10 MHz	Annual Link Unavailability	4.3 mins/year
Total Path Loss	133.94 dB	Prediction Model	ITU-R

Performance Charts





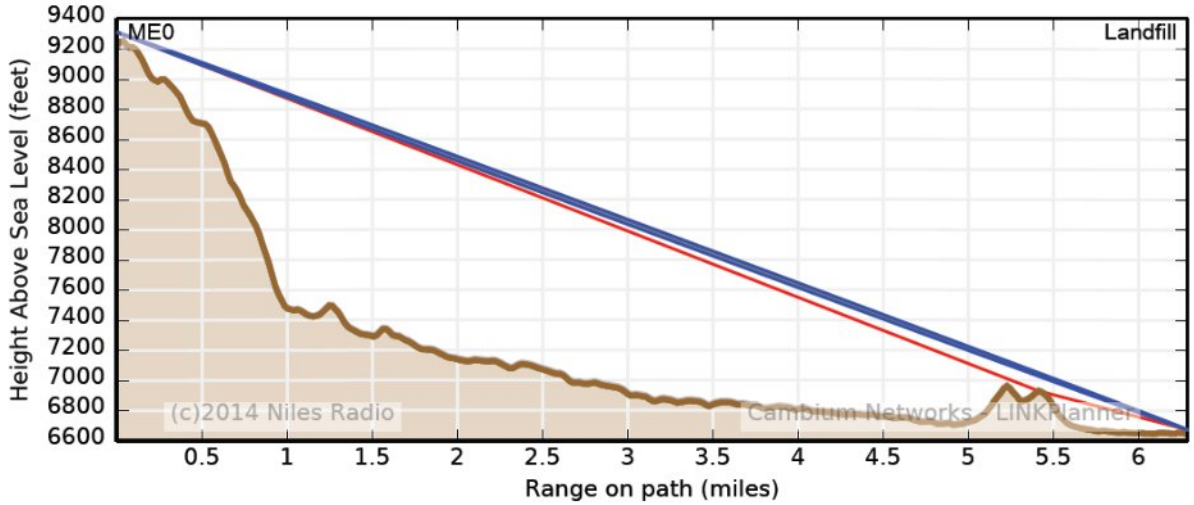
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-249.45 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	336.40 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.12e-05	Rain Availability	99.9992 %
Fade Occurrence Factor (P0)	7.33e-08	Rain Unavailability	4.3 mins/year
Path inclination	148.13 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.21 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	133.44 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.50 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Mt Eldon to Cinder Lakes Landfill

Equipment: Cambium Networks PTP18800 with ODU-B - 1+0

Cambium Networks 2ft HP Antenna 85010089042 - Direct @ 90 ft

Cambium Networks 2ft HP Antenna 85010089042 - Direct @ 30 ft

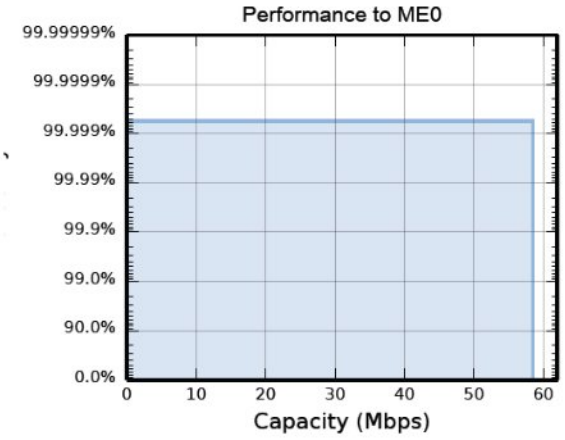


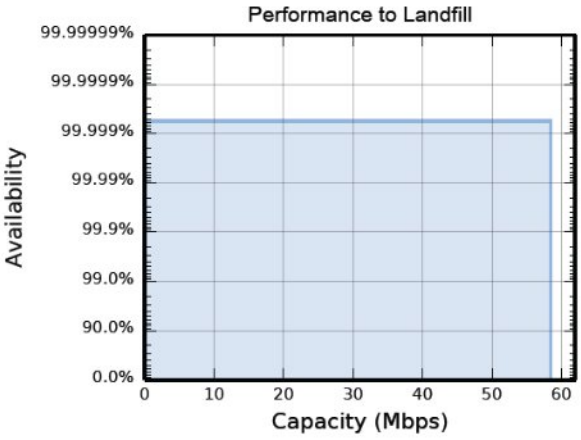
	Performance to ME0	Performance to Landfill
Mean IP	58.5 Mbps	58.5 Mbps
IP Availability	99.9994 % for 50.0 Mbps	99.9994 % for 50.0 Mbps

Link Summary

Link Summary			
Link Length	6.288 mi.	System Gain	181.36 dB
Band	18 GHz	System Gain Margin	43.06 dB
Regulation	FCC	Mean Aggregate Data Rate	117.0 Mbps
Modulation	16QAM 0.91 (58.49Mbps)	Annual Link Availability	99.9994 %
Bandwidth	20 MHz	Annual Link Unavailability	2.9 mins/year
Total Path Loss	138.29 dB	Prediction Model	ITU-R

Performance Charts





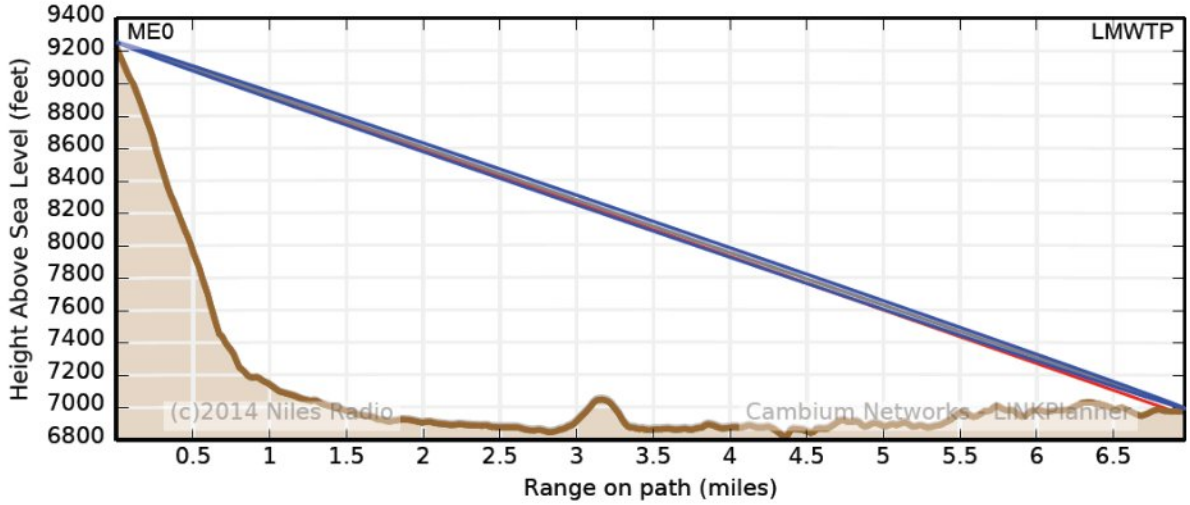
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-248.07 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	330.62 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.11e-05	Rain Availability	99.9994 %
Fade Occurrence Factor (P0)	1.05e-06	Rain Unavailability	2.9 mins/year
Path inclination	79.53 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	29.78 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	137.99 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.31 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Mt Eldon to Lake Mary Water Treatment Plant

Equipment: Cambium Networks PTPL6800 with ODU-A - 1+0

Cambium Networks 6ft HP Antenna 85010092021 - Remote @ 33 ft

Cambium Networks 6ft HP Antenna 85010092021 - Remote @ 18 ft

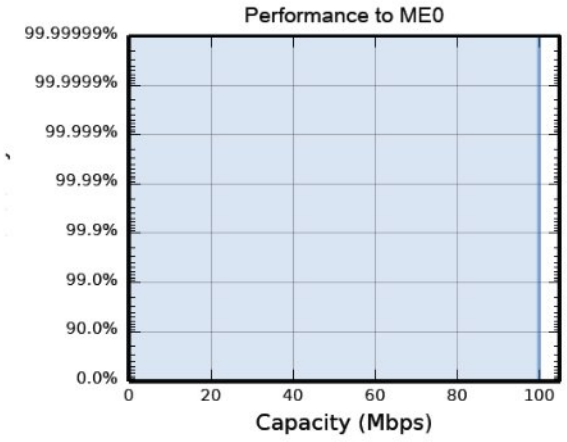


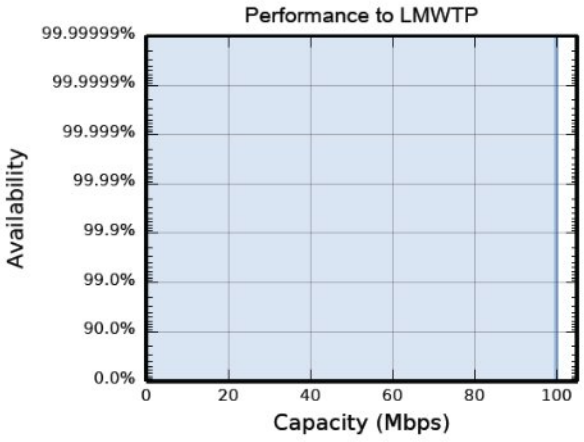
	Performance to ME0	Performance to LMWTP
Mean IP	100.0 Mbps	100.0 Mbps
IP Availability	100.0000 % for 100.0 Mbps	100.0000 % for 100.0 Mbps

Link Summary

Link Summary			
Link Length	6.965 mi.	System Gain	161.81 dB
Band	Lower 6 GHz	System Gain Margin	32.50 dB
Regulation	FCC	Mean Aggregate Data Rate	200.0 Mbps
Modulation	256QAM 0.80 (177.47Mbps)	Annual Link Availability	100.0000 %
Bandwidth	30 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	129.31 dB	Prediction Model	ITU-R

Performance Charts





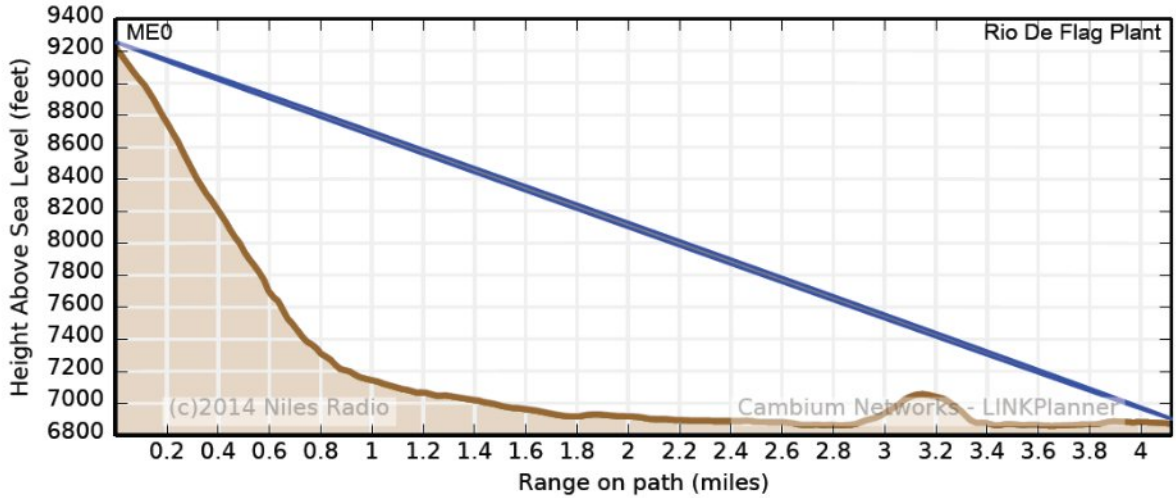
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-250.15 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	339.75 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	6.15e-07	Rain Unavailability	0 secs/year
Path inclination	61.50 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.40 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	129.25 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.06 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Mt Eldon to Rio de Flag Plant

Equipment: Cambium Networks PTP11800 with ODU-B - 1+0

Cambium Networks 4ft HP Antenna 85010089052 - Direct @ 33 ft

Cambium Networks 4ft HP Antenna 85010089052 - Direct @ 33 ft

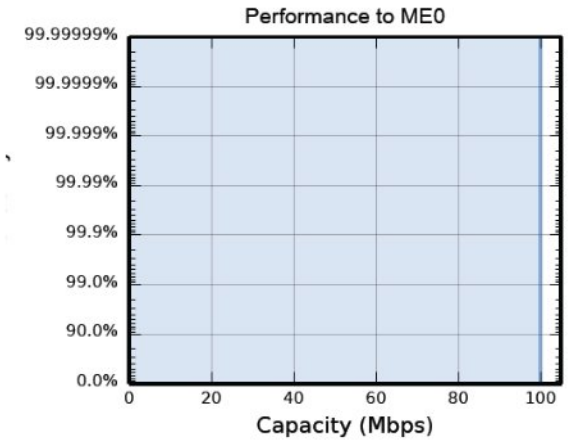


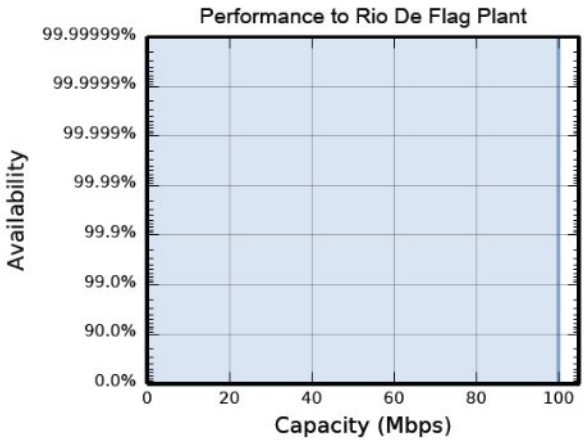
	Performance to ME0	Performance to Rio De Flag Plant
Mean IP	100.0 Mbps	100.0 Mbps
IP Availability	100.0000 % for 100.0 Mbps	100.0000 % for 100.0 Mbps

Link Summary

Link Summary			
Link Length	4.120 mi.	System Gain	168.09 dB
Band	11 GHz	System Gain Margin	38.17 dB
Regulation	FCC	Mean Aggregate Data Rate	200.0 Mbps
Modulation	64QAM 0.88 (135.98Mbps)	Annual Link Availability	100.0000 %
Bandwidth	30 MHz	Annual Link Unavailability	0 secs/year
Total Path Loss	129.92 dB	Prediction Model	ITU-R

Performance Charts





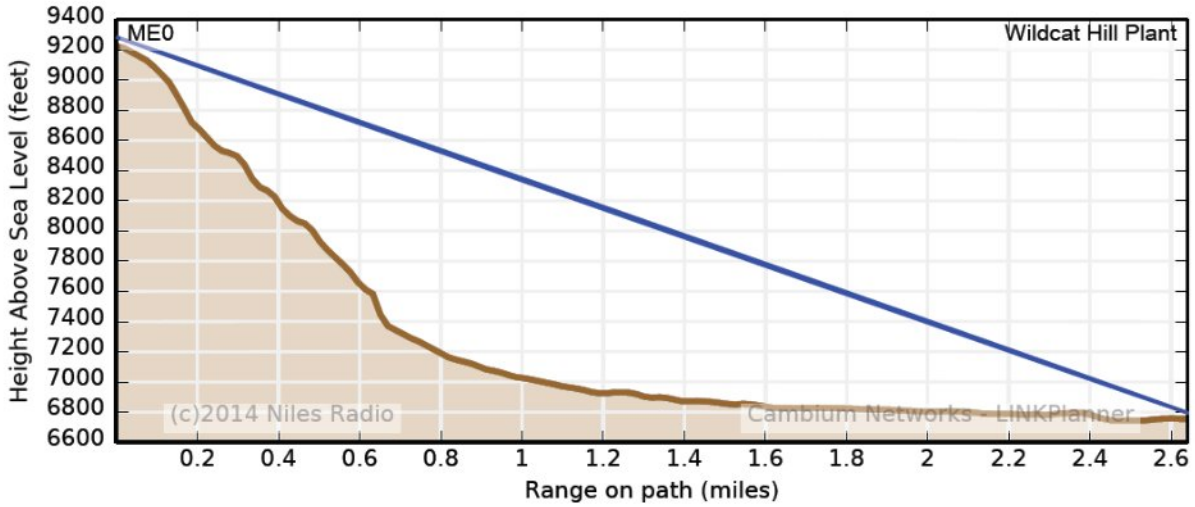
Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-249.65 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	336.64 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.13e-05	Rain Availability	100.0000 %
Fade Occurrence Factor (P0)	1.02e-07	Rain Unavailability	0 secs/year
Path inclination	108.24 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.26 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	129.86 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.05 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Mt Eldon to Wildcat Hill Plant

Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 60 ft

Cambium Networks 1ft HP Antenna 85010089059 - Direct @ 40 ft

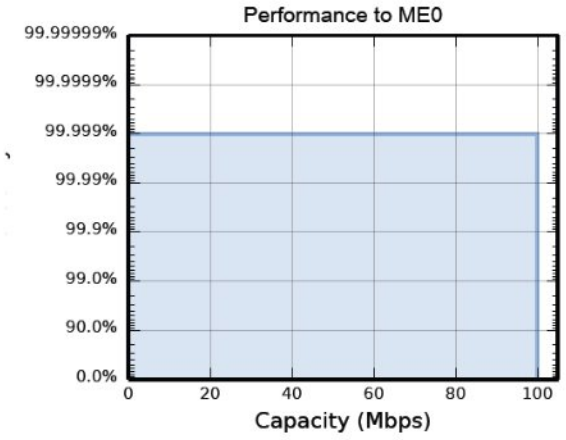


	Performance to ME0	Performance to Wildcat Hill Plant
Mean IP	100.0 Mbps	100.0 Mbps
IP Availability	99.9990 % for 100.0 Mbps	99.9990 % for 100.0 Mbps

Link Summary

Link Summary			
Link Length	2.641 mi.	System Gain	157.22 dB
Band	23 GHz	System Gain Margin	24.78 dB
Regulation	FCC	Mean Aggregate Data Rate	200.0 Mbps
Modulation	256QAM 0.77 (114.4Mbps)	Annual Link Availability	99.9990 %
Bandwidth	20 MHz	Annual Link Unavailability	5.4 mins/year
Total Path Loss	132.45 dB	Prediction Model	ITU-R

Performance Charts



Climatic Factors, Losses and Standards			
dN/dH not exceeded for 1% of time	-248.99 N units/km	Annual 2-way Availability	100.0000 %
Area roughness 110x110km	334.47 metre	Annual 2-way Unavailability	0 secs/year
Geoclimatic factor	6.12e-05	Rain Availability	99.9990 %
Fade Occurrence Factor (P0)	3.69e-08	Rain Unavailability	5.4 mins/year
Path inclination	178.52 mr	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
0.01% Rain rate	30.07 mm/hr	Diffraction Loss	ITU-R P.526-10
Free Space Path Loss	132.02 dB	Propagation	ITU-R P.530-12
Gaseous Absorption Loss	0.43 dB	Rain Rate	ITU-R P.837-5
Link Type	Line-of-Sight	Refractivity Index	ITU-R P.453-9
Excess Path Loss	0.00 dB		

Appendices

Appendix A: Additional Budget Details

Item	Budgetary	Notes
Macmillan Mesa to Adult Center	$18,866.00	23G1
Airport Terminal to Airport Fire Department	$18,866.00	23G1
Aquaplex to East Side Library	$18,866.00	23G1
Aquaplex to Flagstaff Recreation Center	$15,915.00	650INT
Aquaplex to Flagstaff Housing Authority	$18,866.00	23G1
City Hall to Coconino County Offices	$18,866.00	38G1
City Hall to Mt. Elden ME0	$0.00	23G2 EXISTING
Law Enforcement Administration Facility to DH2	$0.00	EXITSING
Law Enforcement Administration Facility to Fire Station 2	$18,866.00	23G1
Leaf to ME0	$0.00	EXISTING
Lake Mary Water Treatment Plant to Fire Station 6	$18,866.00	23G1
MacMillan Mesa to Airport Terminal	$22,506.00	23G4
MacMillan Mesa to City Hall	$24,500.00	18S2*
MacMillan Mesa to East Side Library	$18,866.00	23G1
MacMillan Mesa to Fire Station 1	$18,866.00	23G1
MacMillan Mesa to Fire Station 5	$19,500.00	650G2*
MacMillan Mesa to Jay Lively Arena	$15,915.00	650INT
MacMillan Mesa to ME0	$27,500.00	18S4*
MacMillan Mesa to NAU Internet Direct Feed	$18,866.00	18G1
MacMillan Mesa to Warehouse	$22,866.00	18G2*
ME0 to Fire Station 4	$18,866.00	23G1
ME0 to Landfill	$0.00	EXISTING
ME0 to Lake Mary Water Treatment Plant	$0.00	EXISTING
ME0 to Rio de Flag Plant	$0.00	FUNDED
ME0 to Wildcat Hill Plant	$0.00	EXISTING
Business Accelerator	$0.00	FUNDED
Aquaplex Antenna Mounting Structure ESTIMATED	$12,000.00	**
MacMillan Mesa Equipment Cabinet	$4,800.00	
MacMillan Mesa Tower Design/Permits/Engineering	$2,800.00	
MacMillan Mesa 100' 4 Leg Self Supporting Tower	$42,550.00	
MacMillan Mesa Tower Foundation materials	$6,900.00	
MacMillan Mesa Site Excavation and Concrete Placement	$10,400.00	
MacMillan Mesa Tower Erection	$8,640.00	
Tower Materials Freight and Delivery Charges	$4,500.00	
Radio and Cabinet Freight and Delivery Charges	$2,765.00	
Project Engineering / Path Analysis	$8,200.00	
Installation and Configuration Labor	$58,800.00	
Frequency Coordination and Licensing Services and Fees	$28,800.00	
Anticipated Expenses	$547,383.00	

Niles Radio Recommended Budgetary Funds	$650,000.00
Reserve Funding	$102,617.00