Utah Telecommunication
Open Infrastructure Agency

Request for Proposal for
Network Electronics
RFP # 2021ENG1

May 3, 2021

Checklist
UTOPIA RFP# 2021ENG1

To be considered as a potential participant for the UTOPIA project you must:

❒ Submit your RFP Acknowledgement Form by May 10th, 2021

❒ Submit questions IN WRITING by May 10th, 2021

❒ Deliver proposal NO LATER THAN 5:00 PM, MDT, May 18th, 2021 to:

Jeff Meyer
Network Engineering Manager
5858 S 900 E
Murray, UT
(801) 613-3800

Submission must include:

❒ Letter of Transmittal

❒ One electronic copy containing the entire proposal, including text, spreadsheets, graphics, equipment specifications and diagrams, submitted in the Appendices of the proposal. Submission shall be through email to jmeyer@utopiafiber.com

The Utah Telecommunication Open Infrastructure Agency (UTOPIA) invites you to submit a proposal to provide Network Electronics to the UTOPIA fiber optic infrastructure organization for delivering services across the UTOPIA network. The attached Request for Proposal (RFP) describes the requirements that vendor(s) or manufacturer(s) must meet to be eligible to respond. It includes questions regarding your organization, ordering processes, company financial stability, production capacities, and successful project histories.

- ❒ This RFP outlines format and content requirements for your proposal and includes a listing of critical dates. Of those dates, it is most important to note that all proposals must be received by **5:00 P.M. Mountain Time on May 18th, 2021 via email** to jmeyer@utopiafiber.com. **PROPOSALS SUBMITTED AFTER THE DEADLINE WILL NOT BE CONSIDERED**. Proposals will be submitted in an approved electronic format with a letter of transmittal.

Please use email to direct all questions to Jeff Meyer (jmeyer@utopiafiber.com) Questions received prior to the close of business on May 10th**, 2021** will be answered by a follow-up email to all known prospective respondents and posted on the website.

We look forward to receiving your response.
Very truly yours,

Roger Timmerman
Executive Director
UTOPIA

Table of Contents

1 General Information

1.1 The Entity

The Utah Telecommunication Open Infrastructure Agency (UTOPIA) is a political subdivision of the State of Utah created by interlocal agreement among 15 municipalities for the purpose of solving the last mile challenge in advanced communications for its member cities. UTOPIA's goal is to provide every household and every business access to advanced communications infrastructure, and to enable choice among services and service providers. To accomplish this objective, UTOPIA is building an open-access fiber optic network providing wholesale transport for retail service providers. Currently, the 15 member cities account for a population base of more than 500,000 individuals, 150,000+ households, and 30,000+ businesses.

1.1.1 Creation/History

UTOPIA is a separate legal entity and political subdivision of the State of Utah. UTOPIA was created under the Utah Interlocal Cooperation Act and is governed by the First Amended and Restated Interlocal Cooperative Agreement of the Utah Telecommunication Open Infrastructure Agency, dated as of June 1, 2004, (the "Interlocal Cooperative Agreement").

The Interlocal Cooperation Act authorizes local governmental units to make the most efficient use of their powers by enabling them to cooperate with other governmental units on the basis of mutual advantage to provide services and facilities that will best accommodate the needs and development of local communities. An entity so formed is a political subdivision of the state with power to, among other things, (i) own, acquire, construct, operate, maintain and repair, or cause to be constructed, operated, maintained, and repaired, any facility or improvement provided for in its organization agreement, (ii) borrow money, incur indebtedness and issue revenue bonds or notes for the purposes for which it was created, and (iii) assign, pledge or otherwise convey as security or improvement within or without the State on terms deemed in the best interest of its participants.

In addition to the specific powers enumerated above, which UTOPIA possesses by virtue of being a separate legal entity created under the Interlocal Cooperation Act, UTOPIA's members may contract with UTOPIA to perform any governmental service, activity or undertaking which the members themselves are authorized to perform.

1.1.2 Membership/Organization/Governance

UTOPIA currently has 15 member cities: Brigham City, Cedar City, Cedar Hills, Centerville, Layton, Lindon, Midvale, Murray, City of Orem, Payson, Perry, Riverton, Tremonton, Vineyard, West Valley City (collectively, the "Members"). UTOPIA is governed by

a Board of Directors (the "Board").

The UTOPIA Board consists of directors representing each Member. The Board holds at least one regular meeting annually but may call other meetings as necessary. Each Member is entitled to one vote for each one thousand (1,000) residents, rounded to the nearest one thousand. Only Pledging Members are entitled to vote with respect to all decisions related to: (i) the construction of the Network financed with proceeds of the Bonds relating to that Member's Pledge Agreement, and (ii) the use of discretionary revenues generated from the portion of the Network constructed with proceeds of the Bonds secured by that Member's Pledge Agreement. There must be a quorum present at each meeting to take any action. A quorum consists of the presence of the Board members entitled to cast a majority of the votes of the entire Board (which is not a simple majority of Board members since the voting is weighted based on population).

The Board also elects from among its members a Chair, a First Vice Chair, a Second Vice Chair, a Third Vice Chair and a Fourth Vice Chair. The aforementioned officials serve as the Executive Committee of the Board. The Executive Committee has oversight of the operations of UTOPIA as delegated by the Board. The Board appoints an Executive Director, who has general supervision, management, administration, direction, and control of the business and employees of UTOPIA and such other related duties as may be prescribed by the Board and the bylaws. The Executive Director is authorized to perform any function required of UTOPIA by the Interlocal Cooperative Agreement and the bylaws.

To help facilitate growth, the cities have formed another inter-local entity, called UIA (The Utah Infrastructure Agency) as a separate entity to grow the UTOPIA network and provide more oversight on the growth of our community-owned fiber optic network in our cities. It also makes it easier for other cities that are interested in having this kind of network to join down the road. The UIA is a political subdivision of the State of Utah and was created in June 2010. Nine cities created the agency (Brigham City, Centerville, Layton, Lindon, Midvale, Murray, Orem, Payson, and West Valley City).

UTOPIA has a fiscal year that goes from the July 1st to June 30th.

1.2 Philosophy and Goals

The member communities of UTOPIA have taken the initiative to assure world-class digital connectivity for their residents based on the following principles:

1.2.1 Open Access

Like a public airport, the UTOPIA network has been designed for use by several service and content providers. We believe that a single open network allows more providers to competitively offer more services at lower cost.

A "neutral" network owner and "neutral" system operator is expected to encourage open access and a significant number of service providers, which will contribute to long term growth and stability for the benefit of the community.

1.2.2 Standards Based Architecture

The network is dependent, from a technical standpoint, on an open, standards-based architecture for broadband media content services. This assures flexibility of service, modularity, and interoperability in access, interconnection, and transport. Although the special needs of service providers can be accommodated, the principle of open standards must be preserved.

1.2.3 Scalability

UTOPIA's fiber optic network has the capability of delivering significantly higher bandwidth than the networks of incumbent last mile carriers. Its architecture has the inherent flexibility to accommodate future bandwidth demands of residential, business, educational, governmental, and other customers without major re-design or construction.

1.2.4 Carrier Class Reliability

UTOPIA's network strives to offer carrier class reliability enabling service providers to offer products that can compete with those available from incumbent carriers. All contracts with system operators and service providers must support this commitment.

1.3 The Network

1.3.1 Physical Description

UTOPIA is continuing the process of constructing a wholesale advanced communications network. The Network uses fiber optic technology, which provides transmission of voice, data and video at speeds that are significantly faster than existing copper, cable, or satellite systems. Fiber is currently used for the backbone of the Internet and other high demand applications but has not been widely implemented over "the last mile" into homes and businesses. UTOPIA is laying the fiber optic cable necessary to connect each Member city and the homes and businesses within each Member city. The fiber optic cable is being laid both underground and overhead aerial. Other elements of the Network include conduits, inner ducts, fiber cables, splices, switches, transmitters, terminals, internal power sources and all other items necessary to operate the Network.

The Network is divided into footprints (neighborhood service areas) and interconnecting rings with design and construction partially complete in eleven Members cities.

UTOPIA currently operates a 100 percent fiber-based network. It is an active ethernet topology with no GPON systems within the network. Network equipment is placed in climate-controlled environments that are constantly monitored by our Network Operations Team.

1.3.2 Service Delivery

UTOPIA currently delivers services on a wholesale model in an open access environment. When a Service Provider customer signs up for a fiber connection to UTOPIA we provision a layer 2 transport circuit from the customer back to the Service Provider NNI. Each customer/circuit is configured as a point-to-point circuit. UTOPIA uses Ethernet based switches with a one customer to one switch port ratio.

1.4 Purpose / RFP Overview process

This RFP is soliciting pricing proposals from qualified vendors to provide network electronics to deliver services in the following roles:

- Top of Rack switch (100G Capable)
- Network Edge switch
- 10G Business aggregation device

- 1G business aggregation device
- 1G Residential service delivery device

Vendors must respond to the above in responding to this RFP. Vendors do not have to respond to all categories and can submit multiple responses to one or more roles. The same device can be submitted for multiple roles. For devices that have multiple configuration options vendors must list any options available that pertain to the RFP that they want to be scored on.

For the purpose of this RFP the term 'vendors' can be the actual equipment manufacturer or a reseller/partner. Reseller/partners can submit multiple equipment manufacturer options.

1.4.1 Award Period

UTOPIA intends to award an open-ended contract to one or more vendors. UTOPIA will not guarantee any purchasing volume based on an award. UTOPIA will reserve the right to purchase hardware as needed.

1.4.2 Addendums, Supplements or Amendments to Request for Proposal

If it becomes necessary to revise any part of this RFP, an addendum, supplement, or amendment to this RFP will be provided only to respondents who returned their Acknowledgement Form (see Appendix A).

1.4.3 Calendar of Events

The following table outlines UTOPIA's planned calendar of major events related to the RFP distribution, proposal submission, evaluation, and selection processes.

1.	RFP released to prospective respondents	May 3rd, 2021
2.	RFP Acknowledgment Form returned to UTOPIA	May 10th, 2021
3.	Last date for submission of written questions	May 10th, 2021
4.	Responses to Questions	May 12th, 2021
5.	Proposal submission deadline	May 18th, 2021
6.	Oral Presentations	May 20th-28th, 2021
7.	UTOPIA Proposal Evaluations complete by	June 4th, 2021
8.	Select preferred respondent(s)	June 11th, 2021
9.	Notify selected respondent(s)	June 14th, 2021
10.	Negotiate and Finalize purchase contract(s)	June 30th, 2021

UTOPIA reserves the right to amend the above schedule as necessary.

2 Proposals

Proposals must follow the format prescribed below and must include the requested information and the enclosed Proposal Response Forms. **Failure to complete and furnish all information requested in the form and format specified could result in disqualification. Proposals will not be accepted from any Vendor or Manufacturer that did not submit an**

Acknowledgement form as specified in the checklist (a form is provided in section 7). If you intend to partner with another Vendor or Manufacturer in making a proposal, the submission must be by the Vendor or Manufacturer that submitted the Acknowledgement form.

2.1 Proposal Organization

Your proposal must be organized and indexed in the following format and must contain all items listed below in the sequence indicated.

a. Letter of Transmittal
b. Table of Contents
c. Section 1: Executive summary
d. Section 2: Financial Stability
e. Section 3: Qualifications and Experience
f. Section 4: Client references
g. Section 5: Supplemental information
h. Section 6: Network Electronics Proposal
i. Section 7: Cost / Pricing

Respondents will be required to organize their proposals in the order outlined in this RFP.

Any proposal that does not adhere to these requirements may be deemed non-responsive and may be rejected on that basis.

Respondents may attach other materials that you feel may improve the quality of your responses. These materials must be included as items in Section 5: Supplemental information

2.2 Electronic Proposal Format

At a minimum, respondents must submit their entire proposal electronically via email including text, spreadsheets, graphics and diagrams, and other materials submitted in the Appendices. Electronic files must be submitted as follows: word processing documents and graphics/diagrams in Microsoft Word and/or Adobe Acrobat (.pdf); spreadsheets in Microsoft Excel. The email or package and files must be clearly marked with the Vendor's name and the RFP number. If large file sizes restrict email submission UTOPIA can accept the files through a cloud file sharing service provided by the vendor. Alternatively, vendors can contact UTOPIA for a file transfer option. Vendors can submit hard copies of the proposal, but the electronic submittal will be used for scoring and if there are any differences between hard copies and electronic, UTOPIA will consider the electronic version authoritative.

2.2.1 Letter of Transmittal

A single letter of transmittal must accompany any proposal. The letter must accompany the proposals as a standalone page or file and must:

a. Identify the submitting organization.

b. Identify the name and title of the person authorized to contractually obligate the organization.
c. Identify the name, title and telephone number of the person authorized to negotiate the contract.
d. Identify the names, titles, and telephone numbers of persons to be contacted for clarification.
e. Be signed by the person authorized to contractually obligate the organization.

2.2.2 Table of Contents

The table of contents must be placed immediately after any cover page and before the Executive Summary.

2.2.3 Executive Summary

Label this section "Section 1: Executive Summary" in your proposal. In two pages or less, highlight the significant aspects of your proposal including an outline of your organization, your management processes, financial strength and production capacities, qualifications and experience, client references, and anything else that is pertinent.

2.2.4 Financial Stability

Label this section "Section 2: Financial Stability" in your proposal. Proposals should include the two most recent audited financial statements. Proposals should also include the following:

- Ownership of your company
- Number of years in business
- Geographical location(s)
- Other resources available to support the products offered.

2.2.5 Qualifications and Experience

Label this section "Section 3: Qualifications and Experience" in your proposal. Provide information on relevant personnel from your company with whom UTOPIA would work, should you win a contract; this is essentially your proposed UTOPIA Team. Also include their general availability – whether they will be dedicated to UTOPIA and where will they be located.

2.2.6 Client References

Label this section "Section 4: References" in your proposal. Please provide a list of **at least five** paying customers of your company. The list must provide a customer name, description of the products provided, and a brief description of the project history (timelines, challenges, etc.). For each customer reference, include contact names, phone numbers, and email addresses for staff related to procurement and project management. It is preferred but not required that these references are using the vendor platforms that are being submitted for evaluation.

2.2.7 Supplemental Information

If included, label this section "Section 5: Supplemental Information" in your proposal. Company brochures and other supplementary and marketing materials may be included in this

section of the proposal.

2.2.8 Detailed Response to Network Electronics

Label this section “Section 6: Network Electronics Proposal” in your proposal.

2.2.8.1 Top of Rack Switch – 100G capable

In the proposal, the vendor should clearly state the model number being submitted for the proposal along with the software version to be evaluated. The vendor also needs to state if the software is for evaluation purposes only or in General Release (GA). If submitting multiple solutions label each response as “**Section 6: Network Electronics Proposal – Top of Rack Switch – 100G capable – Proposal 1**”, “**Section 6: Network Electronics Proposal – Top of Rack Switch – 100G capable – Proposal 2**”. The vendor can keep incrementing proposal numbers as needed.

2.2.8.2 Network Access Switch

In the proposal, the vendor should clearly state the model number being submitted for the proposal along with the software version to be evaluated. The vendor also needs to state if the software is for evaluation purposes only or in General Release (GA). If submitting multiple solutions label each response as “**Section 6: Network Electronics Proposal – Network Access Switch – Proposal 1**”, “**Section 6: Network Electronics Proposal – Network Access Switch – Proposal 2**”. The vendor can keep incrementing proposal numbers as needed.

2.2.8.3 10G Business Aggregation Switch

In the proposal, the vendor should clearly state the model number being submitted for the proposal along with the software version to be evaluated. The vendor also needs to state if the software is for evaluation purposes only or in General Release (GA). If submitting multiple solutions label each response as “**Section 6: Network Electronics Proposal – 10G Business Aggregation Switch – Proposal 1**”, “**Section 6: Network Electronics Proposal – 10G Business Aggregation Switch – Proposal 2**”. The vendor can keep incrementing proposal numbers as needed.

2.2.8.4 1G Business Aggregation Switch

In the proposal, the vendor should clearly state the model number being submitted for the proposal along with the software version to be evaluated. The vendor also needs to state if the software is for evaluation purposes only or in General Release (GA). If submitting multiple solutions label each response as “**Section 6: Network Electronics Proposal – 1G Business Aggregation Switch – Proposal 1**”, “**Section 6: Network Electronics Proposal – 1G Business Aggregation Switch – Proposal 2**”. The vendor can keep incrementing proposal numbers as needed.

2.2.8.5 1G Residential Service Delivery Device

In the proposal, the vendor should clearly state the model number being submitted for the proposal along with the software version to be evaluated. The vendor also needs to state if the software is for evaluation purposes only or in General Release (GA). If submitting multiple solutions label each response as “**Section 6: Network Electronics Proposal – 1G Residential**

Service Delivery Device – Proposal 1", "**Section 6: Network Electronics Proposal – 1G Residential Service Delivery Device – Proposal 2**". The vendor can keep incrementing proposal numbers as needed.

2.2.9 Cost/Pricing

Label this section "Section 7: Cost/Pricing" in your proposal.

2.2.10 Oral Presentations

Oral presentations will be allowed as option for this RFP. UTOPIA plans to perform these oral presentations remotely over an application such as Microsoft Teams. UTOPIA will not require vendors to be physically present, and the oral presentation is optional.

UTOPIA plans to schedule these presentations between May 20th – May 28th. The purpose of these presentations is to introduce the vendor's team to the UTOPIA technical team. The vendor can cover any background information and allow the UTOPIA team to clarify any parts of the vendor's response. The oral presentation is not scored itself but can allow UTOPIA to better interpret the vendor's response.

No more than 60 minutes will be allocated to a single vendor for their presentation. Oral presentations can be scheduled through Jeff Meyer at jmeyer@utopiafiber.com

3 Network Electronics

To allow creativity in the proposal process this RFP will not require just the mandatory pricing but will accept alternate pricing proposals for just this RFP alone or in conjunction with other RFP's released during this same time frame. Within those parameters, UTOPIA is open to any workable and cost-efficient proposal.

3.1 Assumptions

Along with the goals listed in Section 1 above, UTOPIA has made these various high-level assumptions/requirements regarding Network Electronics.

3.1.1 Anticipated Scope of Electronics Deployment

Although the UTOPIA network will eventually expand to include tens of thousands, and even hundreds of thousands, of subscribers over its lifetime, UTOPIA uses a phased deployment approach. UTOPIA will order equipment on an as needed basis.

3.1.2 Licensed Features

If a feature is licensed it will be scored as supported with costs being weighed in Section 4: **Costs.** If a technical feature is licensed but no costs are submitted for the license that feature will not be scored.

3.1.3 Different Feature Scoring for Different Sections

UTOPIA is seeking Network Electronics for different applications on the network. UTOPIA may weigh the same feature differently depending on what role the Network Electronics are performing.

3.1.4 Hardware Requirements

UTOPIA expects vendor responses to be for newly manufactured hardware. UTOPIA will not consider used or refurbished hardware as a valid response to the RFP. However, UTOPIA will accept used or demonstration equipment for evaluation of technical features of the platform.

3.1.5 Evaluation Requirements

UTOPIA expects vendors to provide evaluation hardware to verify technical features within 10 business days of the close of the RFP. It is recommended that vendors that plan to respond to the RFP make arrangements as soon as possible to have evaluation hardware sent to UTOPIA. UTOPIA will work with vendors to have hardware ship before the close of the RFP. UTOPIA will also agree to return any evaluation hardware if requested by the vendor.

The UTOPIA mailing address is.
5858 S 900 E
Murray UT, 84121

3.1.6 Warranty

All respondent(s) shall specify all warranty related information in their proposal.

3.2 Network Switches

3.3 Top of Rack Switch (100G Capable)

The proposed switch solution should be a robust feature rich platform that includes the following features:

3.3.1 General Features

The General Features section covers what UTOPIA thinks should be base capabilities for a switch to function on the UTOPIA network.

3.3.1.1 MEF CE 2.0 or CE 3.0

The vendor proposed solution should be MEF CE 2.0 or CE 3.0 Certified. Score is all or nothing, 20 points for certification or 0 points for not being certified. Scoring will be based on the vendor platform being certified according to https://www.mef.net/certification/technology-certification-registry

3.3.1.2 Support AC or DC power inputs

The vendor proposed platform should support AC or DC power inputs if power supplies are fixed, different model numbers for AC or DC are acceptable. UTOPIA's preference is for models that can run both AC and DC power supplies at the same time. It is acceptable for one power supply to be fixed while the other one is swappable.

Score is based on the following:

- AC power support – 10 points
- DC power support – 20 points
- Swappable power supplies – 5 points
- Ability to equip more than one power supply – 5 points
- Ability to run both AC and DC power supplies at the same time – 50 points

Scoring will be based on vendor documentation of each feature.

3.3.1.3 Port Density

The vendor proposed solution should have at least two 100G ports, preferably QSFP28 capable. A number of 10G ports would also be desirable in the SFP+ form factor. UTOPIA's preference is for a switch that is 1RU and has between 24-48 10G ports and two to six 100G ports. If vendors have different switch models with port densities in that range, please submit all models, UTOPIA has different applications for the port densities. If a vendor has a switch that is larger than 1RU, it can be submitted, but will be scored lower on the **Facility Space Requirements** section. This section is scored as a Pass/Fail.

3.3.1.4 3rd Party Transceiver Support

A vendor should respond to this section with the statement "**Should Support**" or "**Does Not Support**". Any response that includes "Should Support" will be tested by UTOPIA technical staff. UTOPIA realizes that vendor platforms may be compatible with 3rd party transceivers, but the vendor will not provide technical support for issues arising from those

transceivers. This section is just to establish if it is technically possible. A vendor does not have to support all transceiver types. The minimum requirement is to support 100G and 10G transceivers. A vendor may submit transceiver pricing in the costs section and those will be evaluated against UTOPIA transceiver costs, not against other vendors. If the vendor responds with "**Does Not Support**" then the vendor will have to provide compatible transceivers for testing. For 100G QSFP28 ER and 100G QSFP28 ZR optics, the device must support RS-FEC Clause 91 on a per 100g port basis. RS-FEC must be configurable on a per port basis to enable/disable the feature.

The vendor proposed solution will be tested with the following transceiver types:

- 100G QSFP28 LR – 5 points
- 100G QSFP28 ER – 5 points
- 100G QSFP28 ZR – 5 points
- 10Gbps 1310nm Dual Fiber SFP+ – 5 points
- 10Gbps 20km BiDi SFP+ – 5 points
- 10Gbps CWDM/DWDM SFP+ – 5 points

3.3.1.5 Facility Space Requirements

Space is at a premium in several locations on the UTOPIA network. The following form factor features will be evaluated and scored. UTOPIA prefers a solution compatible with a 2-post rack. Vendors can submit 4-post rack combatable platforms but will lose all points for this section. Air flow for fans is assumed to be front to back, if there are other fan options for the platform, please state those options.

- Width – The switch needs to fit into 19-inch equipment racks – Pass/Fail. A Fail disqualifies the platform from selection.
- Platform should be able to be mounted in a 2-post telco rack. – 25 points
- Depth – The switch should not exceed 16 inches in depth, UTOPIA will score on the following scale:
    - 1-9 inches deep – 20 points
    - 9.1 to 12 inches deep -10 points
    - 12.1 to 16 inches deep – 5 points
- Mounting Brackets – Mounting brackets need to be flush with the front plate of the switch. The vendor should also submit any additional rack mounting options that are compatible with the platform.
  Score – 5 points

3.3.1.6 Product Life Cycle

UTOPIA expects vendors to offer long term support for the chosen platforms. This section does not cover paid support options. UTOPIA is looking for the vendor to continue to manufacture and provide software updates for the life of the product. UTOPIA expects a minimum of 5 years support for the platform with full points awarded for a guarantee of 8 years of support for the platform. A platform with an End of Life (EoL) date of less than 4 years will not be evaluated.

- 5 Years support – 10 points

- 8 Years support – 25 points

3.3.2 Service Delivery Features

The Service Delivery Features section covers the functionality required to deliver services across the UTOPIA network.

3.3.2.1 VLAN Tagging using 0x8100 Ethertype

UTOPIA expects all vendor solutions to support VLAN tagging, this section is scored on a Pass/Fail with a Fail disqualifying the solution from selection. All VLAN numbers from 1-4095 should be configurable with the option to disable any default VLANs on the switch.

If there is a limitation on how many configured VLANs the platform can support the vendor should point out those limitations.

3.3.2.2 Jumbo Frame Support

The vendor proposed solution should support a port MTU of at least 9212. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.3.2.3 Customer Isolation

The proposed solution should have a configurable feature that prevents two ports in the same isolation group from exchanging broadcast/multicast/unicast traffic on the same VLAN. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.3.2.4 Loop Detection and Suppression

The vendor proposed solution should support loop detection and suppression. UTOPIA will be evaluating the following three areas with the vendor being awarded the highest scoring feature if the platform supports more than one mechanism.

- Detect Customer Loop and Block Forwarding on Port using a PDU – 5 points
- Detect Customer Loop and Block Forwarding on a VLAN per port using a PDU – 10 points
- Detect Customer Loop and Discard Traffic (Dynamically Learned Protected MAC Addresses) – 25 points

3.3.2.5 IGMP Support

UTOPIA offers multicast enabled services such as IPTV services. UTOPIA expects the vendor proposed platform to support the following features:

- IGMP Snooping - Dynamically add groups from PIM router source. – 10 points
- IGMP Snooping – Support Version 2 – 10 points

3.3.2.6 Layer 2 and Layer 3 ACLs

The vendor proposed solution should support Layer 2 and Layer 3 Access Control Lists (ACLs)

- Layer 2 ACL Support – 30 points
    - Layer 2 ACLs should have the ability to partially or fully match a source or destination MAC address. The ACL should then drop or allow the traffic.

    - The ACLs should also have the ability to limit the amount of MAC addresses on a port/VLAN basis.
    - A logging action is also desired. The logging action would document the frame header information into a log file.
- Layer 3 ACL Support – 20 points
    - Layer 3 ACLs should have the ability to be applied to a switch port and match Layer 3 parameters despite not having a local Layer 3 interface for the VLAN.
    - The ACL should have options to match commonly used networking protocols, source/destination IP addresses or source/destination ports. A logging action is also desired. The logging action would document the frame header information into a log file.

3.3.2.7 QoS Support

The vendor proposed solution should support both ingress and egress QoS policies. The platform should support at least eight QoS queues per port/VLAN/service. Traffic should be able to be mapped to QoS queues based on combinations of customer QoS marking (802.1p bits, DSCP and TOS), IP and MAC address criteria.

The platform should also support bandwidth shaping, where UTOPIA should be able to shape bandwidth on a VLAN/port basis. Section scoring will be based on the following:

- Support for at least eight queues per VLAN/port – 10 points
- Support for policing bandwidth – 20 points
- Support for shaping – 40 points (will not be awarded with policing)

3.3.2.8 DHCP Filtering/Snooping

It is desired that the device be capable of having a basic, simple to use method of dropping incoming DHCP offers from customers. If capable, each port should be able to be configured as untrusted or trusted. Untrusted ports will drop the DHCP Offer traffic from other ports. Trusted ports will forward DHCP Offers received to untrusted ports. – 10 points

The platform should also support Option 82 information. – 10 points

3.3.2.9 MPLS Support

UTOPIA may choose to utilize MPLS functionality on a device if the necessary features are available. The device would ideally support RSVP-TE signaled transport tunnels and T- LDP signaled service labels. OSPF with Traffic Engineering would be used to collect traffic engineering data used for CSPF calculations. – 100 points

A device must have a split-horizon mechanism to prevent VPLS service objects from creating a forwarding loop.

MPLS-TP support would be considered if RSVP-TE is not supported.

3.3.2.10 QinQ Support

It is desired that the device be able to support QinQ for a directly connected customer. The device should push/pop an additional VLAN tag on customer traffic and use the Ethertype of 0x8100 for the additional VLAN tag. Ethertypes of 0x9100 or 0x88a8 are not desired for the additional VLAN tag. This section has a score of 100 points.

3.3.3 Support and Maintenance Features

The Support and Maintenance Features section covers functionality required for UTOPIA to manage and support a switch platform on the UTOPIA network.

3.3.3.1 RFC 2544 Support

UTOPIA uses RFC 2544 testing to verify throughput on circuits and core links. These tests are run on external test sets. Testing will be performed on the following configurations:

- Standard test 100G-100G Untagged – 10 points
- Standard test 100G-100G Untagged/Tagged -10 points
- Standard test 10G-100G Untagged/Tagged – 20 points
- Standard test 10G-100G QinQ – 20 points

3.3.3.2 Troubleshooting Commands

The UTOPIA technical staff expects the following functionality from the CLI and will be looking for the following command equivalents. If a single command displays information for multiple functions, points for all the functions will be awarded on their own line items. If vendors have questions about what we are looking for in each command, please submit those questions in the Q&A timeframe. Vendors will only be awarded points if their response includes the CLI commands for these functions:

- "show mac address table" – 1 point
    - "show mac address table (by port)" – 1 point
    - "show mac address table (by VLAN)" – 1 point
    - "show mac address (single)" – 1 point
- "show interfaces/port" – 1 point
- "show port counters" – 1 point
- "clear port counters" – 1 point
- "show stack" – 1 point
- "show system information" – 1 point
- "show inventory information" – 1 point
- "show log" – 1 point
- "show fan speed" – 1 point
- "show CPU utilization" – 1 point
- "show port utilization" – 1 point
- "show alarms" – 1 point
- "show lldp neighbors" – 1 point
- "show IGMP snooping" – 1 point
- "show alarms" – 1 point
- "show IGMP snooping" – 1 point
- "show IP interface" – 1 point
- "show temperature" – 1 point
- "show power supply" – 1 point
- "show interface transceiver/optical" – 1 point
- Support for ping commands – 1 point

- Support for traceroute commands – 1 point
- Support to remotely reboot the switch – 1 point
- Support the ability to disable/enable individual ports – 1 point

3.3.3.3 Management Features

UTOPIA expects the vendor proposed solution to include support for the following features to aid in management of the platform:

- TACACS+ Support with ASCII Authentication – 5 points
- TACACS+ Accounting – 5 points
- TACACS+ Authorization – 5 points
- RADIUS Authentication – 5 points
- SNMPv2 Support – 5 points
- SNMPv3 Support – 5 points
- Statically assigned Layer 3 Interface on VLAN – 5 points
- DHCP Layer 3 Interface on VLAN – 5 points
- SSH Support – 5 points
- Telnet Support (client and server)– 5 points
- NTP Support – 5 points
- External Syslog Support – 5 points
- LLDP Support – 5 points
- Port Mirroring – 5 points
- Dying Gasp/Last Gasp Support – 5 points

3.3.3.4 Automation Features

UTOPIA expects the vendor proposed solution to support auto provisioning features to integrate into UTOPIA's current and future systems. UTOPIA is looking for the following features.

- Configuration via automation protocols/platforms (Netconf, Ansible, etc) – 100 points
- Zero-Touch Provisioning – 50 points
- Vendor specific solutions that are tied to other systems such as a vendor supplied EMS/NMS will be evaluated if deemed feasible by the UTOPIA technical staff.

3.3.4 Optional Features

The Optional Features section lets UTOPIA look at future needs to deliver services on the network. This section will be used to make selections for limited use case applications on the UTOPIA network.

3.3.4.1 IPv6

The proposed solution should have the capabilities to drop Router Advertisements from UNI ports. The solution should be capable of snooping MLD traffic to provide similar capability to IGMP snooping. The device should also potentially support an IPv6 management address.

3.3.4.2 ETR

UTOPIA may have use cases where an outdoor or Extended Temperature Range device may be necessary. The vendor should state if an ETR version of the platform is available. This is for informational purposes and will not be scored.

3.3.4.3 SDN

UTOPIA would like to know the vendor's roadmap for Software Defined Networking for the proposed platforms. This is for informational purposes and will not be scored.

3.3.4.4 EVPN Support

UTOPIA would like to know the platform's capability to support EVPN configurations, including support for EVPN-VXLAN, EVPN-MPLS, support for Type-5 routing, and EVPN ESI Multihoming via EVPN-LAG or MC-LAG in active-active and active-standby configurations.

3.4 Edge Access Switch

The proposed switch solution should be a robust feature rich platform that includes the following features:

3.4.1 General Features

The General Features section covers what UTOPIA thinks should be base capabilities for a switch to function on the UTOPIA network.

3.4.1.1 MEF CE 2.0 or CE 3.0

The vendor proposed solution should be MEF CE 2.0 or CE 3.0 Certified. Score is all or nothing, 20 points for certification or 0 points for not being certified. Scoring will be based on the vendor platform being certified according to https://www.mef.net/certification/technology-certification-registry

3.4.1.2 Support AC or DC power inputs

The vendor proposed platform should support AC or DC power inputs if power supplies are fixed, different model numbers for AC or DC are acceptable. UTOPIA's preference is for models that can run both AC and DC power supplies at the same time. It is acceptable for one power supply to be fixed while the other one is swappable.

Score is based on the following:

- AC power support – 10 points
- DC power support – 20 points
- Swappable power supplies – 5 points
- Ability to equip more than one power supply – 5 points
- Ability to run both AC and DC power supplies at the same time – 50 points

Scoring will be based on vendor documentation of each feature.

3.4.1.3 1G Port Density

The vendor proposed solution should maximize the number of 1G ports available on the chassis while still including 10G uplink ports. (UTOPIA prefers solutions that approaches or exceeds 48 1G ports per rack unit)

Score is based on the following (note in cases of platform using a fraction of a RU UTOPIA will round up for calculations, for example, a platform using 5 ½ RU will be rounded up to 6 RU for calculating ports per RU)

- 1-12 ports per RU – 0 points
- 13-24 ports per RU – 5 points
- 25-36 ports per RU – 10 points
- 37-48 ports per RU – 40 points
- 49+ ports per RU – 50 points

Scoring for single RU switches will be based on a single switch port density. A chassis platform score will be based on a fully loaded chassis with 1G ports and at least two 10G ports.

3.4.1.4 10G Uplink Ports

The vendor proposed solution should have at least two 10G ports available for uplinks to

the UTOPIA core. These ports do not need to be on redundant cards. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.4.1.5 3rd Party Transceiver Support

A vendor should respond to this section with the statement "**Should Support**" or "**Does Not Support**". Any response that includes "Should Support" will be tested by UTOPIA technical staff. UTOPIA realizes that vendor platforms may be compatible with 3rd party transceivers, but the vendor will not provide technical support for issues arising from those transceivers. This section is just to establish if it is technically possible. A vendor does not have to support all transceiver types. The minimum requirement is to support 100G and 10G transceivers. A vendor may submit transceiver pricing in the costs section and those will be evaluated against UTOPIA transceiver costs not against other vendors. If the vendor responds with "**Does Not Support**" then the vendor will have to provide compatible transceivers for testing.

The vendor proposed solution will be tested with the following transceiver types:

- 100Mbps Full Duplex Bidi – 5 points
- 1Gbps 1310nm Dual Fiber – 5 points
- 1Gbps Copper SFP – 5 points
- 10/100/1000 Copper SFP – 5 points
- 1Gbps Bi-Di – 5 points
- 1Gbps CWDM/DWDM – 5 points
- 1Gbps CSFP (if applicable) – 5 points
- 10Gbps 1310nm Dual Fiber SFP+/XFP – 5 points
- 10Gbps 20km BiDi SFP+/XFP – 5 points
- 10Gbps CWDM/DWDM SFP+/XFP – 5 points

3.4.1.6 Facility Space Requirements

Space is at a premium in several locations on the UTOPIA network. The following form factor features will be evaluated and scored. UTOPIA prefers a solution compatible with a 2-post rack. Vendors can submit 4-post rack combatable platforms but will lose all points for this section. Air flow for fans is assumed to be front to back, if there are other fan options for the platform, please state those options.

- Width – The switch needs to fit into 19-inch equipment racks – Pass/Fail. A Fail disqualifies the platform from selection.
- UTOPIA prefers a solution compatible with a 2-post rack. Vendors can submit 4-post rack combatable platforms but will lose all points for this section.
- Depth – The switch should not exceed 16 inches in depth, UTOPIA will score on the following scale:
    - 1-9 inches deep – 20 points
    - 9.1 to 12 inches deep -10 points
    - 12.1 to 16 inches deep – 5 points
- Mounting Brackets – Mounting brackets need to be flush with the front plate of the switch. The vendor should also submit any additional rack mounting options that are compatible with the platform.

Score – 5 points

3.4.1.7 Stacking Support

UTOPIA prefers a vendor solution that uses a dedicated stacking ring mechanism to administer two or more switches with a single IP address. A chassis solution will be awarded full points. A vendor solution that uses in band ports to connect switches through a local ring with a management IP address assigned per switch is acceptable but will not be awarded points for this section. To receive points the vendor will need to state the maximum amount of switches the stacking mechanism will support. If a stacking configuration limitation restricts UTOPIA's configuration options, then no score will be awarded for this section. A chassis solution will have to state the maximum amount of 1G ports available in the chassis in a configuration that still supports 10G uplink ports. – 25 points

3.4.1.8 Uplink Redundancy Support

UTOPIA requires the vendor proposed platform to support redundancy on the uplink ports. The minimum requirement is for the platform to support two upstream 10G links to the network core. Each 10G port will face a geographically diverse core node. These core nodes will support LACP, MPLS and MC-LAG. Ports can be in an active/active or active/standby configuration. This section will be scored in two areas. The first area is, will the platform support uplink redundancy, this is scored on a pass/fail with a fail disqualifying the solution from selection. The second area evaluated is if the switch redundancy features are compatible with the UTOPIA Core devices. The ports themselves do not need to be on redundant cards.

3.4.1.9 Product Life Cycle

UTOPIA expects vendors to offer long term support for the chosen platforms. This section does not cover paid support options. UTOPIA is looking for the vendor to continue to manufacture and provide software updates for the life of the product. UTOPIA expects a minimum of 5 years support for the platform with full points awarded for a guarantee of 8 years of support for the platform. A platform with an End of Life (EoL) date of less than 4 years will not be evaluated.

- 5 Years support – 10 points
- 8 Years support – 25 points

3.4.2 Service Delivery Features

The Service Delivery Features section covers the functionality required to deliver services across the UTOPIA network.

3.4.2.1 VLAN Tagging using 0x8100 Ethertype

UTOPIA expects all vendor solutions to support VLAN tagging, this section is scored on a Pass/Fail with a Fail disqualifying the solution from selection. All VLAN numbers from 1-4095 should be configurable with the option to disable any default VLANs on the switch.

If there is a limitation on how many configured VLANs the platform can support the vendor should point out those limitations.

3.4.2.2 Jumbo Frame Support

The vendor proposed solution should support a port MTU of at least 9212. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.4.2.3 Customer Isolation

The proposed solution should have a configurable feature that prevents two ports in the same isolation group from exchanging broadcast/multicast/unicast traffic on the same VLAN. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.4.2.4 Loop Detection and Suppression

The vendor proposed solution should support loop detection and suppression. UTOPIA will be evaluating the following three areas with the vendor being awarded the highest scoring feature if the platform supports more than one mechanism.

- Detect Customer Loop and Block Forwarding on Port using a PDU – 5 points
- Detect Customer Loop and Block Forwarding on a VLAN per port using a PDU – 10 points
- Detect Customer Loop and Discard Traffic (Dynamically Learned Protected MAC Addresses) – 25 points

3.4.2.5 IGMP Support

UTOPIA offers multicast enabled services such as IPTV services. UTOPIA expects the vendor proposed platform to support the following features:

- IGMP Snooping - Dynamically add groups from PIM router source. – 10 points
- IGMP Snooping – Support Version 2 – 10 points

3.4.2.6 Layer 2 and Layer 3 ACLs

The vendor proposed solution should support Layer 2 and Layer 3 Access Control Lists (ACLs)

- Layer 2 ACL Support – 30 points
  - Layer 2 ACLs should have the ability to partially or fully match a source or destination MAC address. The ACL should then drop or allow the traffic.
  - The ACLs should also have the ability to limit the amount of MAC addresses on a port/VLAN basis.
  - A logging action is also desired. The logging action would document the frame header information into a log file.
- Layer 3 ACL Support – 20 points
  - Layer 3 ACLs should have the ability to be applied to a switch port and match Layer 3 parameters despite not having a local Layer 3 interface for the VLAN.
  - The ACL should have options to match commonly used networking protocols, source/destination IP addresses or source/destination ports. A logging action is also desired. The logging action would document the frame header information into a log file.

3.4.2.7 QoS Support

The vendor proposed solution should support both ingress and egress QoS policies. The platform should support at least eight QoS queues per port/VLAN/service. Traffic should be able to be mapped to QoS queues based on combinations of customer QoS marking (802.1p bits, DSCP and TOS), IP and MAC address criteria.

The platform should also support bandwidth shaping, where UTOPIA should be able to shape bandwidth on a VLAN/port basis. Section scoring will be based on the following:

- Support for at least eight queues per VLAN/port – 10 points
- Support for policing bandwidth – 20 points
- Support for shaping – 40 points (will not be awarded with policing)

3.4.2.8 DHCP Filtering/Snooping

It is desired that the device be capable of having a basic, simple to use method of dropping incoming DHCP offers from customers. If capable, each port should be able to be configured as untrusted or trusted. Untrusted ports will drop the DHCP Offer traffic from other ports. Trusted ports will forward DHCP Offers received to untrusted ports. – 10 points

The platform should also support Option 82 information. – 10 points

3.4.2.9 MPLS Support

UTOPIA may choose to utilize MPLS functionality on a device if the necessary features are available. The device would ideally support RSVP-TE signaled transport tunnels and T-LDP signaled service labels. OSPF with Traffic Engineering would be used to collect traffic engineering data used for CSPF calculations. – 75 points

A device must have a split-horizon mechanism to prevent VPLS service objects from creating a forwarding loop.

MPLS-TP support would be considered if RSVP-TE is not supported.

3.4.2.10 QinQ Support

It is desired that the device be able to support QinQ for a directly connected customer. The device should push/pop an additional VLAN tag on customer traffic and use the Ethertype of 0x8100 for the additional VLAN tag. Ethertypes of 0x9100 or 0x88a8 are not desired for the additional VLAN tag. This section has a score of 100 points.

3.4.3 Support and Maintenance Features

The Support and Maintenance Features section covers functionality required for UTOPIA to manage and support a switch platform on the UTOPIA network.

3.4.3.1 OAM Support

The vendor proposed solution should support Y.1731 ETH-CPM. We will configure an UP MEP on the upstream LAG. The core router is configured to run Synthetic Loss Measurement and Two Way Delay Measurement tests towards the switch. The switch should be able to process the traffic and send back the necessary response. In an MPLS set up, UP MEPs may be configured on both mesh service elements in the VPLS service. The proposed solution should support at least 200 UP MEPs on the device and support ethernet loopback. – 25 points

3.4.3.2 RFC 2544 Support

UTOPIA uses RFC 2544 testing to verify throughput on circuits and core links. These tests are run on external test sets. Testing will be performed on the following configurations:

- Standard test 1G-1G Untagged – 10 points
- Standard test 1G-1G Untagged/Tagged -10 points
- Standard test 1G-10G Untagged/Tagged – 20 points
- Standard test 1G-10G QinQ – 20 points

3.4.3.3 Troubleshooting Commands

The UTOPIA technical staff expects the following functionality from the CLI and will be looking for the following command equivalents. If a single command displays information for multiple functions points for all the functions will be awarded on their own line items. If vendors have questions about what we are looking for in each command, please submit those questions in the Q&A timeframe. Vendors will only be awarded points if their response includes the CLI commands for these functions:

- "show mac address table" – 1 point
  - "show mac address table (by port)" – 1 point
  - "show mac address table (by VLAN)" – 1 point
  - "show mac address (single)" – 1 point
- "show interfaces/port" – 1 point
- "show port counters" – 1 point
- "clear port counters" – 1 point
- "show stack" – 1 point
- "show system information" – 1 point
- "show inventory information" – 1 point
- "show log" – 1 point
- "show fan speed" – 1 point
- "show CPU utilization" – 1 point
- "show port utilization" – 1 point
- "show alarms" – 1 point
- "show lldp neighbors" – 1 point
- "show IGMP snooping" – 1 point
- "show alarms" – 1 point
- "show IGMP snooping" – 1 point
- "show IP interface" – 1 point
- "show temperature" – 1 point
- "show power supply" – 1 point
- "show interface transceiver/optical" – 1 point
- Support for ping commands – 1 point
- Support for traceroute commands – 1 point
- Support to remotely reboot the switch – 1 point
- Support the ability to disable/enable individual ports – 1 point

3.4.3.4 Management Features

UTOPIA expects the vendor proposed solution to include support for the following features to aid in management of the platform:

- TACACS+ Support with ASCII Authentication – 5 points
- TACACS+ Accounting – 5 points
- TACACS+ Authorization – 5 points
- RADIUS Authentication – 5 points
- SNMPv2 Support – 5 points
- SNMPv3 Support – 5 points
- Statically assigned Layer 3 Interface on VLAN – 5 points
- DHCP Layer 3 Interface on VLAN – 5 points
- SSH Support – 5 points
- Telnet Support (client and server)– 5 points
- NTP Support – 5 points
- External Syslog Support – 5 points
- LLDP Support – 5 points
- Port Mirroring – 5 points
- Dying Gasp/Last Gasp Support – 5 points

3.4.3.5 Automation Features

UTOPIA expects the vendor proposed solution to support auto provisioning features to integrate into UTOPIA's current and future systems. UTOPIA is looking for the following features.

- Configuration via automation protocols/platforms (Netconf, Ansible, etc) – 100 points
- Zero-Touch Provisioning – 50 points
- Vendor specific solutions that are tied to other systems such as a vendor supplied EMS/NMS will be evaluated if deemed feasible by the UTOPIA technical staff.

3.4.4 Optional Features

The Optional Features section lets UTOPIA look at future needs to deliver services on the network. This section will be used to make selections for limited use case applications on the UTOPIA network.

3.4.4.1 IPv6

The proposed solution should have the capabilities to drop Router Advertisements from UNI ports. The solution should be capable of snooping MLD traffic to provide similar capability to IGMP snooping. The device should also potentially support an IPv6 management address.

3.4.4.2 ETR

UTOPIA may have use cases where an outdoor or Extended Temperature Range device may be necessary. The vendor should state if an ETR version of the platform is available. This is for informational purposes and will not be scored.

3.4.4.3 SDN

UTOPIA would like to know the vendor's roadmap for Software Defined Networking for the proposed platforms. This is for informational purposes and will not be scored.

3.4.4.4 EVPN Support

UTOPIA would like to know the platform's capability to support EVPN configurations, including support for EVPN-VXLAN, EVPN-MPLS, support for Type-5 routing, and EVPN ESI Multihoming via EVPN-LAG or MC-LAG in active-active and active-standby configurations.

3.5 10G Business Aggregation Switch

3.5.1 General Features

UTOPIA has seen an increase in high-capacity business circuits. To service this need UTOPIA requires a Business Aggregation Switch that can accept 10G uplinks and have 10G and 1G UNI ports.

3.5.1.1 MEF CE 2.0 or CE 3.0

The vendor proposed solution should be MEF CE 2.0 or CE 3.0 Certified. Score is all or nothing, 20 points for certification or 0 points for not being certified. Scoring will be based on the vendor platform being certified according to https://www.mef.net/certification/technology-certification-registry

3.5.1.2 Support AC or DC power inputs

The vendor proposed platform should support AC or DC power inputs if power supplies are fixed, different model numbers for AC or DC are acceptable. UTOPIA's preference is for models that can run both AC and DC power supplies at the same time. It is acceptable for one power supply to be fixed while the other one is swappable.

Score is based on the following:

- AC power support – 10 points
- DC power support – 20 points
- Swappable power supplies – 5 points
- Ability to equip more than one power supply – 5 points
- Ability to run both AC and DC power supplies at the same time – 50 points

Scoring will be based on vendor documentation of each feature.

3.5.1.3 Port Density

UTOPIA requires a standard 10G Business Aggregation Switch that has a port density that covers most of use cases for business connections. A port that can support both 1G and 10G will be scored for each section.

- Two or more 10G UNI optical ports available. These ports can be XFP or SFP+ based ports. – 10 points
- Four or more 10G UNI optical ports available. These ports can be XFP or SFP+ based ports. – 10 points
- Eight or more 1G UNI ports available. These can be a combination of copper and optical ports. At least one of the ports must be optical to receive points. – 10 points
- Twenty or more 1G UNI ports available. These can be a combination of copper and optical ports. At least one of the ports must be optical to receive points. – 10 points

3.5.1.4 10G Uplink Ports

The vendor proposed solution should have at least one 10G port available for uplink to the UTOPIA network. This port must be an optical port that can either be XFP or SFP+ based.

This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.5.1.5 3rd Party Transceiver Support

A vendor should respond to this section with the statement "**Should Support**" or "**Does Not Support**". Any response that includes "Should Support" will be tested by UTOPIA technical staff. UTOPIA realizes that vendor platforms may be compatible with 3rd party transceivers, but the vendor will not provide technical support for issues arising from those transceivers. This section is just to establish if it is technically possible. A vendor does not have to support all transceiver types. The minimum requirement is to support 100G and 10G transceivers. A vendor may submit transceiver pricing in the costs section and those will be evaluated against UTOPIA transceiver costs not against other vendors. If the vendor responds with "**Does Not Support**" then the vendor will have to provide compatible transceivers for testing.

The vendor proposed solution will be tested with the following transceiver types:

- 100Mbps Full Duplex Bidi – 5 points
- 1Gbps 1310nm Dual Fiber – 5 points
- 1Gbps Copper SFP – 5 points
- 10/100/1000 Copper SFP – 5 points
- 1Gbps Bi-Di – 5 points
- 1Gbps CWDM/DWDM – 5 points
- 1Gbps CSFP (if applicable) – 5 points
- 10Gbps 1310nm Dual Fiber SFP+/XFP – 5 points
- 10Gbps 20km BiDi SFP+/XFP – 5 points
- 10Gbps CWDM/DWDM SFP+/XFP – 5 points

3.5.1.6 Facility Space Requirements

Space is at a premium in several locations on the UTOPIA network. The following form factor features will be evaluated and scored. Air flow for fans is assumed to be front to back, if there are other fan options for the platform, please state those options.

- Width – The switch needs to fit into 19-inch equipment racks if the switch is half width and needs an extension ear to be rack mounted that is acceptable. The vendor will need to submit rack mount kit part numbers if available. – Pass/Fail. A Fail disqualifies the platform from selection
- Wall Mount – The vendor proposed solution must have the ability to be wall mounted either by rear facing mounting holes or the ability to turn mounting brackets 90 degrees. – Pass/Fail. A Fail disqualifies the platform from selection
- Mounting Brackets – Mounting brackets need to be flush with the front plate of the switch

Score – 5 points

3.5.2 Service Delivery Features

The Service Delivery Features section covers the functionality required to deliver services across the UTOPIA network.

3.5.2.1 VLAN Tagging using 0x8100 Ethertype

UTOPIA expects all vendor solutions to support VLAN tagging, this section is scored on a Pass/Fail with a Fail disqualifying the solution from selection. All VLAN numbers from 1-4095 should be configurable with the option to disable any default VLANs on the switch.

If there is a limitation on how many configured VLANs the platform can support the vendor should point out those limitations.

3.5.2.2 Jumbo Frame Support

The vendor proposed solution should support a port MTU of at least 9212. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.5.2.3 Customer Isolation

The proposed solution should have a configurable feature that prevents two ports in the same isolation group from exchanging broadcast/multicast/unicast traffic on the same VLAN. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.5.2.4 Loop Detection and Suppression

The vendor proposed solution should support loop detection and suppression. UTOPIA will be evaluating the following three areas with the vendor being awarded the highest scoring feature if the platform supports more than one mechanism.

- Detect Customer Loop and Block Forwarding on Port using a PDU – 5 points
- Detect Customer Loop and Block Forwarding on a VLAN per port using a PDU – 10 points
- Detect Customer Loop and Discard Traffic (Dynamically Learned Protected MAC Addresses) – 25 points

3.5.2.5 IGMP Support

UTOPIA offers multicast enabled services such as IPTV services. UTOPIA expects the vendor proposed platform to support the following features:

- IGMP Snooping - Dynamically add groups from PIM router source. – 10 points
- IGMP Snooping – Support Version 2 – 10 points

3.5.2.6 Layer 2 and Layer 3 ACLs

The vendor proposed solution should support Layer 2 and Layer 3 Access Control Lists (ACLs)

- Layer 2 ACL Support – 30 points
  - Layer 2 ACLs should have the ability to partially or fully match a source or destination MAC address. The ACL should then drop or allow the traffic.
  - The ACLs should also have the ability to limit the amount of MAC addresses on a port/VLAN basis.
  - A logging action is also desired. The logging action would document the frame header information into a log file
- Layer 3 ACL Support – 20 points
  - Layer 3 ACLs should have the ability to be applied to a switch port and match Layer 3 parameters despite not having a local Layer 3 interface for the VLAN.

- The ACL should have options to match commonly used networking protocols, source/destination IP addresses or source/destination ports. A logging action is also desired. The logging action would document the frame header information into a log file

3.5.2.7 QoS Support

The vendor proposed solution should support both ingress and egress QoS policies. The platform should support at least eight QoS queues per port/VLAN/service. Traffic should be able to be mapped to QoS queues based on combinations of customer QoS marking (802.1p bits, DSCP and TOS), IP and MAC address criteria.

The platform should also support bandwidth shaping, where UTOPIA should be able to shape bandwidth on a VLAN/port basis. Section scoring will be based on the following:

- Support for at least eight queues per VLAN/port – 10 points
- Support for policing bandwidth – 20 points
- Support for shaping – 40 points (will not be awarded with policing)

3.5.2.8 DHCP Filtering/Snooping

It is desired that the device be capable of having a basic, simple to use method of dropping incoming DHCP offers from customers. If capable, each port should be able to be configured as untrusted or trusted. Untrusted ports will drop the DHCP Offer traffic from other ports. Trusted ports will forward DHCP Offers received to untrusted ports. – 10 points

The platform should also support Option 82 information. – 10 points

3.5.2.9 MPLS Support

UTOPIA may choose to utilize MPLS functionality on a device if the necessary features are available. The device would ideally support RSVP-TE signaled transport tunnels and T- LDP signaled service labels. OSPF with Traffic Engineering would be used to collect traffic engineering data used for CSPF calculations. – 50 points

A device must have a split-horizon mechanism to prevent VPLS service objects from creating a forwarding loop.

MPLS-TP support would be considered if RSVP-TE is not supported.

3.5.2.10 QinQ support

It is desired that the device be able to support QinQ for a directly connected customer. The device should push/pop an additional VLAN tag on customer traffic and use the Ethertype of 0x8100 for the additional VLAN tag. Ethertypes of 0x9100 or 0x88a8 are not desired for the additional VLAN tag. This section has a score of 100 points.

3.5.3 Support and Maintenance Features

The Support and Maintenance Features section covers functionality required for UTOPIA to management and support for a switch platform on the UTOPIA network.

3.5.3.1 OAM Support

The vendor proposed solution should support Y.1731 ETH-CPM. We will configure an UP MEP on the upstream LAG. The core router is configured to run Synthetic Loss

Measurement and Two Way Delay Measurement tests towards the switch. The switch should be able to process the traffic and send back the necessary response. In an MPLS set up, UP MEPs may be configured on both mesh service elements in the VPLS service. The proposed solution should support at least 200 UP MEPs on the device and support ethernet loopback. – 25 points

3.5.3.2 RFC 2544 Support

UTOPIA uses RFC 2544 testing to verify throughput on circuits and core links. These tests are run on external test sets. Testing will be performed on the following configurations:

- Standard test 1G-1G Untagged – 10 points
- Standard test 1G-1G Untagged/Tagged -10 points
- Standard test 1G-1G QinQ – 10 points
- Standard test 1G-10G Untagged/Tagged – 20 points
- Standard test 1G-10G QinQ – 20 points

3.5.3.3 Troubleshooting Commands

The UTOPIA technical staff expects the following functionality from the CLI and will be looking for the following command equivalents. If a single command displays information for multiple functions points for all the functions will be awarded on their own line items. If vendors have questions about what we are looking for in each command, please submit those questions in the Q&A timeframe. Vendors will only be awarded points if their response includes the CLI commands for these functions:

- ""“show mac address table” – 1 point
  - “show mac address table (by port)” – 1 point
  - “show mac address table (by VLAN)” – 1 point
  - “show mac address (single)” – 1 point
- “show interfaces/port” – 1 point
- “show port counters” – 1 point
- “clear port counters” – 1 point
- “show stack” – 1 point
- “show system information” – 1 point
- “show inventory information” – 1 point
- “show log” – 1 point
- “show fan speed” – 1 point
- “show CPU utilization” – 1 point
- “show port utilization” – 1 point
- “show alarms” – 1 point
- “show lldp neighbors” – 1 point
- “show IGMP snooping” – 1 point
- “show alarms” – 1 point
- “show IGMP snooping” – 1 point
- “show IP interface” – 1 point
- “show temperature” – 1 point
- “show power supply” – 1 point
- “show interface transceiver/optical” – 1 point

- Support for ping commands – 1 point
- Support for traceroute commands – 1 point
- Support to remotely reboot the switch – 1 point
- Support the ability to disable/enable individual ports – 1 point

3.5.3.4 Management Features

UTOPIA expects the vendor proposed solution to include support for the following features to aid in management of the platform:

- TACACS+ Support with ASCII Authentication – 5 points
- TACACS+ Accounting – 5 points
- TACACS+ Authorization – 5 points
- RADIUS Authentication – 5 points
- SNMPv2 Support – 5 points
- SNMPv3 Support – 5 points
- Statically assigned Layer 3 Interface on VLAN – 5 points
- DHCP Layer 3 Interface on VLAN – 5 points
- SSH Support – 5 points
- Telnet Support (client and server)– 5 points
- NTP Support – 5 points
- External Syslog Support – 5 points
- LLDP Support – 5 points
- Port Mirroring – 5 points
- Dying Gasp/Last Gasp Support – 5 points

3.5.3.5 Automation Features

- UTOPIA expects the vendor proposed solution to support auto provisioning features to integrate into UTOPIA's current and future systems. UTOPIA is looking for the following features. Configuration via automation protocols/platforms such as Netconf, Ansible, etc. – 100 points
- Zero-Touch Provisioning – 50 points
- Vendor specific solutions that are tied to other systems such as a vendor supplied EMS/NMS will be evaluated if deemed feasible by the UTOPIA technical staff.

3.5.4 Optional Features

The Optional Features section lets UTOPIA look at future needs to deliver services on the network. This section will be used to make selections for limited use case applications on the UTOPIA network.

3.5.4.1 IPv6

The proposed solution should have the capabilities to drop Router Advertisements from UNI ports. The solution should be capable of snooping MLD traffic to provide similar capability to IGMP snooping. The device should also potentially support an IPv6 management address.

3.5.4.2 ETR

UTOPIA may have use cases where an outdoor or Extended Temperature Range device may be necessary. The vendor should state if an ETR version of the platform is available. This is for informational purposes and will not be scored.

3.5.4.3 SDN

UTOPIA would like to know the vendor's roadmap for Software Defined Networking for the proposed platforms. This is for informational purposes and will not be scored.

3.5.4.4 EVPN Support

UTOPIA would like to know the platform's capability to support EVPN configurations, including support for EVPN-VXLAN, EVPN-MPLS, support for Type-5 routing, and EVPN ESI Multihoming via EVPN-LAG or MC-LAG in active-active and active-standby configurations.

3.6 1G Business Aggregation Switch

3.6.1 General Features

UTOPIA has seen an increase in business circuits. UTOPIA is looking for a cost-effective solution to serve a single 1G circuit or several small business circuits with a 1G uplink to the UTOPIA network.

3.6.1.1 MEF CE 2.0 or CE 3.0

The vendor proposed solution should be MEF CE 2.0 or CE 3.0 Certified. Score is all or nothing, 20 points for certification or 0 points for not being certified. Scoring will be based on the vendor platform being certified according to https://www.mef.net/certification/technology-certification-registry

3.6.1.2 Support AC or DC power inputs

The vendor proposed platform should support AC or DC power inputs if power supplies are fixed, different model numbers for AC or DC are acceptable. It is acceptable for one power supply to be fixed while the other one is swappable.

Score is based on the following:

- AC power support – 10 points
- DC power support – 20 points
- Swappable power supplies – 5 points
- Ability to equip more than one power supply – 5 points
- Ability to run both AC and DC power supplies at the same time – 50 points

Scoring will be based on vendor documentation of each feature.

3.6.1.3 Port Density

UTOPIA requires a standard 1G Business Aggregation Switch that has a port density that covers most of use cases for business connections. This section scoring will be based on the following:

- Two or more 1G UNI optical ports available. – 10 points
- Two or more 1G UNI copper ports available. – 10 points
- Four or more 1G UNI optical ports available. – 10 points
- Ten or more 1G UNI ports available. These can be a combination of copper and optical ports. At least one of the ports must be optical to receive points. Combo ports are acceptable. – 10 points

3.6.1.4 3rd Party Transceiver Support

A vendor should respond to this section with the statement "**Should Support**" or "**Does Not Support**". Any response that includes "Should Support" will be tested by UTOPIA technical staff. UTOPIA realizes that vendor platforms may be compatible with 3rd party transceivers, but the vendor will not provide technical support for issues arising from those transceivers. This section is just to establish if it is technically possible. A vendor does not have to support all transceiver types. The minimum requirement is to support 100G and 10G transceivers. A vendor may submit transceiver pricing in the costs section and those will be

evaluated against UTOPIA transceiver costs not against other vendors. If the vendor responds with "**Does Not Support**" then the vendor will have to provide compatible transceivers for testing.

The vendor proposed solution will be tested with the following transceiver types:

- 100Mbps Full Duplex Bidi – 5 points
- 1Gbps 1310nm Dual Fiber – 5 points
- 1Gbps Copper SFP (if the vendor solution has copper UNI ports this item will be awarded full points) – 5 points
- 10/100/1000 Copper SFP (if the vendor solution has copper UNI ports this item will be awarded full points) – 5 points
- 1Gbps Bi-Di – 5 points
- 1Gbps CWDM/DWDM – 5 points

3.6.1.5 Facility Space Requirements

Space is at a premium in several locations on the UTOPIA network. The following form factor features will be evaluated and scored. Air flow for fans is assumed to be front to back, if there are other fan options for the platform please state those options.

- Width – The switch needs to fit into 19-inch equipment racks if the switch is half width and needs an extension ear to be rack mounted that is acceptable. The vendor will need to submit rack mount kit part numbers if available. – Pass/Fail. A Fail disqualifies the platform from selection.
- Wall Mount – The vendor proposed solution must have the ability to be wall mounted either by rear facing mounting holes or the ability to turn mounting brackets 90 degrees. – Pass/Fail. A Fail disqualifies the platform from selection.
- Mounting Brackets – Mounting brackets need to be flush with the front plate of the switch.

Score – 5 points

3.6.2 Service Delivery Features

The Service Delivery Features section covers the functionality required to deliver services across the UTOPIA network.

3.6.2.1 VLAN Tagging using 0x8100 Ethertype

UTOPIA expects all vendor solutions to support VLAN tagging, this section is scored on a Pass/Fail with a Fail disqualifying the solution from selection. All VLAN numbers from 1-4095 should be configurable with the option to disable any default VLANs on the switch.

If there is a limitation on how many configured VLANs the platform can support the vendor should point out those limitations.

3.6.2.2 Jumbo Frame Support

The vendor proposed solution should support a port MTU of at least 9212. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.6.2.3 Customer Isolation

The proposed solution should have a configurable feature that prevents two ports in the

same isolation group from exchanging broadcast/multicast/unicast traffic on the same VLAN. This section is scored on a Pass/Fail with a Fail disqualifying the solution from selection.

3.6.2.4 Loop Detection and Suppression

The vendor proposed solution should support loop detection and suppression. UTOPIA will be evaluating the following three areas with the vendor being awarded the highest scoring feature if the platform supports more than one mechanism.

- Detect Customer Loop and Block Forwarding on Port using a PDU – 5 points
- Detect Customer Loop and Block Forwarding on a VLAN per port using a PDU – 10 points
- Detect Customer Loop and Discard Traffic (Dynamically Learned Protected MAC Addresses) – 25 points

3.6.2.5 IGMP Support

UTOPIA offers multicast enabled services such as IPTV services. UTOPIA expects the vendor proposed platform to support the following features:

- IGMP Snooping - Dynamically add groups from PIM router source.
- IGMP Snooping – Support Version 2

3.6.2.6 Layer 2 and Layer 3 ACLs

The vendor proposed solution should support Layer 2 and Layer 3 Access Control Lists (ACLs)

- Layer 2 ACL Support – 30 points
  - Layer 2 ACLs should have the ability to partially or fully match a source or destination MAC address. The ACL should then drop or allow the traffic.
  - The ACLs should also have the ability to limit the amount of MAC addresses on a port/VLAN basis.
  - A logging action is also desired. The logging action would document the frame header information into a log file.
- Layer 3 ACL Support – 20 points
  - Layer 3 ACLs should have the ability to be applied to a switch port and match Layer 3 parameters despite not having a local Layer 3 interface for the VLAN.
  - The ACL should have options to match commonly used networking protocols, source/destination IP addresses or source/destination ports. A logging action is also desired. The logging action would document the frame header information into a log file.

3.6.2.7 QoS Support

The vendor proposed solution should support both ingress and egress QoS policies. The platform should support at least eight QoS queues per port/VLAN/service. Traffic should be able to be mapped to QoS queues based on combinations of customer QoS marking (802.1p bits, DSCP and TOS), IP and MAC address criteria.

The platform should also support bandwidth shaping, where UTOPIA should be able to shape bandwidth on a VLAN/port basis. Section scoring will be based on the following:

- Support for at least eight queues per VLAN/port – 10 points

- Support for policing bandwidth – 20 points
- Support for shaping – 40 points (will not be awarded with policing)

3.6.2.8 DHCP Filtering/Snooping

It is desired that the device be capable of having a basic, simple to use method of dropping incoming DHCP offers from customers. If capable, each port should be able to be configured as untrusted or trusted. Untrusted ports will drop the DHCP Offer traffic from other ports. Trusted ports will forward DHCP Offers received to untrusted ports. – 10 points

The platform should also support Option 82 information. – 10 points

3.6.2.9 MPLS Support

UTOPIA may choose to utilize MPLS functionality on a device if the necessary features are available. The device would ideally support RSVP-TE signaled transport tunnels and T- LDP signaled service labels. OSPF with Traffic Engineering would be used to collect traffic engineering data used for CSPF calculations. – 25 points

A device must have a split-horizon mechanism to prevent VPLS service objects from creating a forwarding loop.

MPLS-TP support would be considered if RSVP-TE is not supported.

3.6.2.10 QinQ Support

It is desired that the device be able to support QinQ for a directly connected customer. The device should push/pop an additional VLAN tag on customer traffic and use the Ethertype of 0x8100 for the additional VLAN tag. Ethertypes of 0x9100 or 0x88a8 are not desired for the additional VLAN tag. This section has a score of 100 points.

3.6.3 Support and Maintenance Features

The Support and Maintenance Features section covers functionality required for UTOPIA to manage and support a switch platform on the UTOPIA network.

3.6.3.1 OAM Support

The vendor proposed solution should support Y.1731 ETH-CPM. We will configure an UP MEP on the upstream LAG. The core router is configured to run Synthetic Loss Measurement and Two Way Delay Measurement tests towards the switch. The switch should be able to process the traffic and send back the necessary response. In an MPLS set up, UP MEPs may be configured on both mesh service elements in the VPLS service. The proposed solution should support at least 200 UP MEPs on the device and support ethernet loopback. – 25 points

3.6.3.2 RFC 2544 Support

UTOPIA uses RFC 2544 testing to verify throughput on circuits and core links. These tests are run on external test sets. Testing will be performed on the following configurations:

- Standard test 1G-1G Untagged – 10 points
- Standard test 1G-1G Untagged/Tagged -10 points
- Standard test 1G-1G QinQ – 10 points

3.6.3.3 Troubleshooting Commands

The UTOPIA technical staff expects the following functionality from the CLI and will be looking for the following command equivalents. If a single command displays information for multiple functions points for all the functions will be awarded on their own line items. If vendors have questions about what we are looking for in each command, please submit those questions in the Q& A timeframe. Vendors will only be awarded points if their response includes the CLI commands for these functions:

- "show mac address table" – 1 point
  - "show mac address table (by port)" – 1 point
  - "show mac address table (by VLAN)" – 1 point
  - "show mac address (single)" – 1 point
- "show interfaces/port" – 1 point
- "show port counters" – 1 point
- "clear port counters" – 1 point
- "show stack" – 1 point
- "show system information" – 1 point
- "show inventory information" – 1 point
- "show log" – 1 point
- "show fan speed" – 1 point
- "show CPU utilization" – 1 point
- "show port utilization" – 1 point
- "show alarms" – 1 point
- "show lldp neighbors" – 1 point
- "show IGMP snooping" – 1 point
- "show alarms" – 1 point
- "show IGMP snooping" – 1 point
- "show IP interface" – 1 point
- "show temperature" – 1 point
- "show power supply" – 1 point
- "show interface transceiver/optical" – 1 point
- Support for ping commands – 1 point
- Support for traceroute commands – 1 point
- Support to remotely reboot the switch – 1 point
- Support the ability to disable/enable individual ports – 1 point

3.6.3.4 Management Features

UTOPIA expects the vendor proposed solution to include support for the following features to aid in management of the platform:

- TACACS+ Support with ASCII Authentication – 5 points
- TACACS+ Accounting – 5 points
- TACACS+ Authorization – 5 points
- RADIUS Authentication – 5 points
- SNMPv2 Support – 5 points
- SNMPv3 Support – 5 points

- Statically assigned Layer 3 Interface on VLAN – 5 points
- DHCP Layer 3 Interface on VLAN – 5 points
- SSH Support – 5 points
- Telnet Support (client and server)– 5 points
- NTP Support – 5 points
- External Syslog Support – 5 points
- LLDP Support – 5 points
- Port Mirroring – 5 points
- Dying Gasp/Last Gasp Support – 5 points

3.6.3.5 Automation Features

- UTOPIA expects the vendor proposed solution to support auto provisioning features to integrate into UTOPIA's current and future systems. UTOPIA is looking for the following features. Configuration via automation protocols/platforms (Netconf, Ansible, etc) – 100 points
- Zero-Touch Provisioning – 50 points
- Vendor specific solutions that are tied to other systems such as a vendor supplied EMS/NMS will be evaluated if deemed feasible by the UTOPIA technical staff.

3.6.4 Optional Features

The Optional Features section lets UTOPIA look at future needs to deliver services on the network. This section will be used to make selections for limited use case applications on the UTOPIA network.

3.6.4.1 IPv6

The proposed solution should have the capabilities to drop Router Advertisements from UNI ports. The solution should be capable of snooping MLD traffic to provide similar capability to IGMP snooping. The device should also potentially support an IPv6 management address.

3.6.4.2 ETR

UTOPIA may have use cases where an outdoor or Extended Temperature Range device may be necessary. The vendor should state if an ETR version of the platform is available. This is for informational purposes and will not be scored.

3.6.4.3 SDN

UTOPIA would like to know the vendor's roadmap for Software Defined Networking for the proposed platforms. This is for informational purposes and will not be scored.

3.6.4.4 EVPN Support

UTOPIA would like to know the platform's capability to support EVPN configurations, including support for EVPN-VXLAN, EVPN-MPLS, support for Type-5 routing, and EVPN ESI Multihoming via EVPN-LAG or MC-LAG in active-active and active-standby configurations.

3.7 1G Residential Service Delivery Device

3.7.1 General Features

UTOPIA has seen a large increase in residential customers. To accommodate this growth UTOPIA is looking for a low cost and feature rich service delivery device. Some vendors would label this device an Optical Network Termination (ONT) device. This device will be used on an active ethernet network not a GPON network.

3.7.1.1 MEF CE 2.0 or CE 3.0

The vendor proposed solution should be MEF CE 2.0 or CE 3.0 Certified. Score is all or nothing, 20 points for certification or 0 points for not being certified. Scoring will be based on the vendor platform being certified according to https://www.mef.net/certification/technology-certification-registry

3.7.1.2 Support AC or DC power inputs

The vendor proposed platform should support an AC power input. If power supplies are fixed, different model numbers for AC or DC are acceptable. UTOPIA's preference is for AC power supplies. This is a Pass/Fail score.

3.7.1.3 Wall Mount options

If the platform requires a mounting bracket for a wall mount option, the vendor will need to specify the part number and cost. UTOPIA also prefers the mounting bracket to also act as fiber management. If there is a separate fiber management part number, the vendor will need to specify that part number and cost. This is a Pass/Fail score for the ability to wall mount.

3.7.1.4 Port Density

UTOPIA requires a standard 1G Residential Service Delivery device that has a port density that covers most of use cases for residential connections. UTOPIA's preference is a device with a fixed bidirectional (bidi) optic and two to six RJ-45 copper ports. Score is 50 points for meeting the port density requirements. Additional port density will not be awarded additional points.

3.7.1.5 UPS backup

UTOPIA would like a platform compatible with a small form factor UPS that uses a 6-pin connector. – 25 points.

If vendors have a similar compatible UPS please submit the model number and costs for evaluation.

3.7.2 Service Delivery Features

The Service Delivery Features section covers the functionality required to deliver services across the UTOPIA network.

3.7.2.1 VLAN Tagging using 0x8100 Ethertype

UTOPIA expects all vendor solutions to support VLAN tagging, this section is scored on

a Pass/Fail with a Fail disqualifying the solution from selection. All VLAN numbers from 1-4095 should be configurable with the option to disable any default VLANs on the switch.

If there is a limitation on how many configured VLANs the platform can support the vendor should point out those limitations.

3.7.2.2 Jumbo Frame Support

The vendor proposed solution should support a port MTU of at least 9212. This section is score is 50 points.

3.7.2.3 Loop Detection and Suppression

The vendor proposed solution should support loop detection and suppression. UTOPIA will be evaluating the following three areas with the vendor being awarded the highest scoring feature if the platform supports more than one mechanism.

- Detect Customer Loop and Block Forwarding on Port using a PDU – 5 points
- Detect Customer Loop and Block Forwarding on a VLAN per port using a PDU – 10 points
- Detect Customer Loop and Discard Traffic (Dynamically Learned Protected MAC Addresses) – 25 points

3.7.2.4 IGMP Support

UTOPIA offers multicast enabled services such as IPTV services. UTOPIA expects the vendor proposed platform to support the following features:

- IGMP Snooping - Dynamically add groups from PIM router source. – 10 points
- IGMP Snooping – Support Version 2 – 10 points

3.7.2.5 Layer 2 and Layer 3 ACLs

The vendor proposed solution should support Layer 2 and Layer 3 Access Control Lists (ACLs)

- Layer 2 ACL Support – 30 points
  - Layer 2 ACLs should have the ability to partially or fully match a source or destination MAC address. The ACL should then drop or allow the traffic.
  - The ACLs should also have the ability to limit the amount of MAC addresses on a port/VLAN basis.
  - A logging action is also desired. The logging action would document the frame header information into a log file.
- Layer 3 ACL Support – 20 points
  - Layer 3 ACLs should have the ability to be applied to a switch port and match Layer 3 parameters despite not having a local Layer 3 interface for the VLAN.
  - The ACL should have options to match commonly used networking protocols, source/destination IP addresses or source/destination ports. A logging action is also desired. The logging action would document the frame header information into a log file.

3.7.2.6 QoS Support

The vendor proposed solution should support both ingress and egress QoS policies. The

platform should support at least eight QoS queues per port/VLAN/service. Traffic should be able to be mapped to QoS queues based on combinations of customer QoS marking (802.1p bits, DSCP and TOS), IP and MAC address criteria.

The platform should also support bandwidth shaping, where UTOPIA should be able to shape bandwidth on a VLAN/port basis. Section scoring will be based on the following:

- Support for at least eight queues per VLAN/port – 10 points
- Support for policing bandwidth – 20 points
- Support for shaping – 40 points (will not be awarded with policing)

3.7.2.7 DHCP Filtering/Snooping

It is desired that the device be capable of having a basic, simple to use method of dropping incoming DHCP offers from customers. If capable, each port should be able to be configured as untrusted or trusted. Untrusted ports will drop the DHCP Offer traffic from other ports. Trusted ports will forward DHCP Offers received to untrusted ports. – 10 points

The platform should also support Option 82 information. – 10 points

3.7.2.8 QinQ Support

It is desired that the device be able to support QinQ for a directly connected customer. The device should push/pop an additional VLAN tag on customer traffic and use the Ethertype of 0x8100 for the additional VLAN tag. Ethertypes of 0x9100 or 0x88a8 are not desired for the additional VLAN tag. This section has a score of 50 points.

3.7.3 Support and Maintenance Features

The Support and Maintenance Features section covers functionality required for UTOPIA to manage and support a switch platform on the UTOPIA network.

3.7.3.1 Troubleshooting Commands

The UTOPIA technical staff expects the following functionality from the CLI and will be looking for the following command equivalents. If a single command displays information for multiple functions points for all the functions will be awarded on their own line items. If vendors have questions about what we are looking for in each command, please submit those questions in the Q&A timeframe. Vendors will only be awarded points if their response includes the CLI commands for these functions:

- "show mac address table" – 1 point
  - "show mac address table (by port)" – 1 point
  - "show mac address table (by VLAN)" – 1 point
  - "show mac address (single)" – 1 point
- "show interfaces/port" – 1 point
- "show port counters" – 1 point
- "clear port counters" – 1 point
- "show stack" – 1 point
- "show system information" – 1 point
- "show inventory information" – 1 point
- "show log" – 1 point
- "show fan speed" – 1 point

- “show CPU utilization” – 1 point
- “show port utilization” – 1 point
- “show alarms” – 1 point
- “show lldp neighbors” – 1 point
- “show IGMP snooping” – 1 point
- “show alarms” – 1 point
- “show IGMP snooping” – 1 point
- “show IP interface” – 1 point
- “show temperature” – 1 point
- “show power supply” – 1 point
- “show interface transceiver/optical” – 1 point
- Support for ping commands – 1 point
- Support for traceroute commands – 1 point
- Support to remotely reboot the switch – 1 point
- Support the ability to disable/enable individual ports – 1 point

3.7.3.2 Management Features

UTOPIA expects the vendor proposed solution to include support for the following features to aid in management of the platform:

- TACACS+ Support with ASCII Authentication – 5 points
- TACACS+ Accounting – 5 points
- TACACS+ Authorization – 5 points
- RADIUS Authentication – 5 points
- SNMPv2 Support – 5 points
- SNMPv3 Support – 5 points
- Statically assigned Layer 3 Interface on VLAN – 5 points
- DHCP Layer 3 Interface on VLAN – 5 points
- SSH Support – 5 points
- Telnet Support (client and server)– 5 points
- NTP Support – 5 points
- External Syslog Support – 5 points
- LLDP Support – 5 points
- Port Mirroring – 5 points
- Dying Gasp/Last Gasp Support – 5 points

3.7.3.3 Automation Features

UTOPIA expects the vendor proposed solution to support auto provisioning features to integrate into UTOPIA’s current and future systems. UTOPIA is looking for the following features. Only the highest scoring feature will be scored.

- Configuration via automation protocols/platforms (Netconf, Ansible, etc) – 100 points
- TR-069 support – 100 points
- Zero-Touch Provisioning – 50 points
- Vendor specific solutions that are tied to other systems such as a vendor supplied

EMS/NMS will be evaluated if deemed feasible by the UTOPIA technical staff.

3.7.4 Optional Features

The Optional Features section lets UTOPIA look at future needs to deliver services on the network. This section will be used to make selections for limited use case applications on the UTOPIA network.

3.7.4.1 IPv6

The proposed solution should have the capabilities to drop Router Advertisements from UNI ports. The solution should be capable of snooping MLD traffic to provide similar capability to IGMP snooping. The device should also potentially support an IPv6 management address.

3.7.4.2 ETR

UTOPIA may have use cases where an outdoor or Extended Temperature Range device may be necessary. The vendor should state if an ETR version of the platform is available. This is for informational purposes and will not be scored.

4 Costs

UTOPIA will be evaluating unit costs based on several criteria, cost per port, upfront capital costs, support costs, licensing costs, transceiver costs (if not compatible with UTOPIA supplied transceivers) and any costs that would be incurred by UTOPIA to install and support the platform. Additional costs or cost reductions such as volume discounts will also be evaluated.

4.1 Assumptions

UTOPIA expects unit costs to decrease during the life of an electronics platform. For this RFP UTOPIA expects costs to remain consistent for the first 12 months after the award. After the first 12-month period UTOPIA may choose to enter into additional annual contracts or chose to negotiate price on a per order basis. All costs should be listed in US Dollars.

4.2 Payment Terms

UTOPIA will be issuing purchase orders (POs) for equipment. UTOPIA uses the term NET30 for payment of invoices. Payment will be made in US Dollars only. UTOPIA will issue payments for NET30 terms the later date of invoice received, or material received.

4.3 Equipment Costs

The vendor will submit a MS Excel spreadsheet that lists all part numbers that UTOPIA will need to implement the solution and a per unit cost for each part number.

4.4 Platform Costs

This section will list the cost details UTOPIA will be evaluating. UTOPIA will be using the costs from the vendor supplied spreadsheet.

4.4.1 Total cost (Top of Rack Switch 100g Capable Only)

In this section the score will be based on total cost of the switch including the hardware and any mandatory software or support costs.

Section scoring will be based on the following scale:

- Total capital costs below $5000.00 – 100 points
- Total capital costs between $5000.01 and $10,000.00 – 75 points
- Total capital costs between $10,000.01 and $15,000.00 – 50 points
- Total capital costs between $15,000.01 and $20,000.00 – 25 points

Total capital costs over $20,001 – 0 points

4.4.2 Cost per Port (Edge Switch Only)

In this section cost per port will be based on 1G ports available as UNI ports. This will be based on the total amount of 1G UNI ports available in a stack or chassis divided by the costs of that configuration. The vendor will need to submit all the part numbers and quantities needed to

obtain a maximum amount of 1G ports in a stack or chassis. Additional parts such as stacking cables or power supplies needed must be stated. If the vendor submits an invalid configuration this section will not be scored. Pricing will be taken from the spreadsheet submitted as part of section 4.1.3 Equipment Costs. Section scoring will be based on the following scale:

- Cost per port less than $50.00 per port – 100 points
- Cost per port between $50.00 and $75.00 – 75 points
- Cost per port between $75.00 and $100.00 – 50 points
- Cost per port between $100.00 and $200.00 – 25 points
- Cost per port over $200.00 – 0 points

4.4.3 Cost per Port (10g and 1G Business Aggregation Switches Only)

In this section cost per port will be based on UNI ports. This will be based on the total amount of UNI ports available on a switch divided by the costs of that configuration. The vendor will need to submit all the part numbers and quantities needed to obtain a maximum amount of ports on a switch. Pricing will be taken from the spreadsheet submitted as part of section 4.1.3 Equipment Costs. Section scoring will be based on the following scale:

- Cost per port less than $50.00 per port – 100 points
- Cost per port between $50.00 and $75.00 – 75 points
- Cost per port between $75.00 and $100.00 – 50 points
- Cost per port between $100.00 and $200.00 – 25 points
- Cost per port over $200.00 – 0 points

4.4.4 Unit Costs (Residential Service Delivery Device)

In this section the cost per unit will be scored. Pricing per port will not be evaluated, this section assumes the platform meets the port requirements. Wall mount bracket options will also be included in the cost calculation. Note that a platform will only be scored once depending on the bracket the platform fits in.

- Cost per unit less than $100.00 – 100 points
- Cost per unit less than $150.00 – 75 points
- Cost per unit less than $200.00 – 50 points
- Cost per unit less than $250.00 – 25 points
- Cost per unit more than $300.00 – 0 points

4.4.5 Upfront Capital Costs (Edge Switch Only)

In this section UTOPIA will be evaluating the capital costs needed to support the first customer off the platform and various customer count thresholds. The vendor will need to specify the hardware configuration needed for each threshold. If a vendor supplied configuration is deemed not valid that section will not be scored. If the vendor requires software purchases and support for the platform that cost will be included in the cost.

4.4.6 Cost of the first UNI port (Edge Switch Only)

Section scoring will be based on the following scale:

- Total capital costs below $2000.00 – 100 points
- Total capital costs between $2000.01 and $4000.00 – 75 points
- Total capital costs between $4000.01 and $8000.00 – 50 points

- Total capital costs between $8000.01 and $10,000.00 – 25 points
- Total capital costs over $10,000.01 – 0 points

4.4.7 Cost of first 100 UNI ports (Edge Switch Only)

Section scoring will be based on the following scale:

- Total capital costs below $5000.00 – 100 points
- Total capital costs between $5000.01 and $10,000.00 – 75 points
- Total capital costs between $10,000.01 and $15,000.00 – 50 points
- Total capital costs between $15,000.01 and $20,000.00 – 25 points
- Total capital costs over $20,001 – 0 points

4.4.8 Cost of first 200 UNI ports (Edge Switch Only)

Section scoring will be based on the following scale:

- Total capital costs below $10,000.00 – 100 points
- Total capital costs between $10,000.01 and $15,000.00 – 75 points
- Total capital costs between $15,000.01 and $20,000.00 – 50 points
- Total capital costs between $20,000.01 and $30,000.00 – 25 points
- Total capital costs over $30,001 – 0 points

4.4.9 Cost of first 500 UNI ports (Edge Switch Only)

Section scoring will be based on the following scale:

- Total capital costs below $25,000.00 – 100 points
- Total capital costs between $25,000.01 and $35,000.00 – 75 points
- Total capital costs between $35,000.01 and $45,000.00 – 50 points
- Total capital costs between $45,000.01 and $55,000.00 – 25 points
- Total capital costs over $55,001 – 0 points

4.4.10 Licensing Costs

The vendor must state any licensing costs for features detailed in Section 3. Please state if licensing costs are annual or one time.

4.4.11 Transceiver Costs

The vendor must state transceiver costs for the types listed in section 3 if the platform does not support 3rd party transceivers.

4.5 Support Costs

The vendor will need to list any mandatory support contract details. If a paid support contract is mandatory those costs will be part of the calculation. UTOPIA would like to see optional support costs that cover the following criteria. A vendor only has to respond to criteria it supports. If the vendor has other support options it feels would be useful it is free to submit those options.

- 7x24x365 full support – hardware and software
- Business hours only support

- Per incident support costs
- Replace and Return hardware support
- Online only support.
- Professional Services
- Software updates

4.6 Miscellaneous Costs

The vendor can state any other costs here not detailed in previous sections such as software costs.

4.7 Volume Discounts

UTOPIA recognizes that several vendors offer volume discounts. Volume discounts are not required to be submitted as part of the RFP. UTOPIA has three requirements for volume discounts:

- Discount period for purchasing cannot be more than 12 months.
- Purchasing amount cannot exceed $250,000 during a 12-month period.
- UTOPIA will not commit to purchasing more than 10000 UNI ports worth of equipment in a 12-month period.
- The $250,000 limit is per role, meaning that Top of Rack switch, Edge access switch, 10G Business Aggregation switch, 1G Business Aggregation switch and Residential Service Delivery device would each have a separate $250,000 volume.

If submitting volume discounts, please list volume discounts as a separate item. This section will not be scored and is for informational purposes only.

5 Scoring

UTOPIA intends to award to vendors with the best score between technical features, and costs. UTOPIA may choose to award to multiple vendors or to no vendors. UTOPIA may also choose to award to vendors based on optional features for limited use cases.

Each device role will be scored separately. Also, each platform from a single vendor submitted per role will be scored separately. This would mean it is possible for the same device to be scored differently depending which network role it is being scored on.

5.1 Scoring Weights

Scoring weights will be based on a scale of 1-100. 50 points available for technical features, 50 points available for costs. From the following examples, the scoring would break down as follows:

- Vendor A – 90 points
- Vendor B – 93.3 points
- Vendor C – 90 points

5.2 Technical Features (Section Score 50 points)

The scoring for technical features will be based on the highest scoring vendor receiving the maximum score of 50 points. Each remaining vendor will receive a score based on a percentage of score of the highest scoring vendor. Note the following example:

- Vendor A scores 750 on technical features (max points)– 50 points
- Vendor B scores 700 on technical features (93.3% of Vendor A's score) – 46.65 points
- Vendor C scores 600 on technical features (80% of Vendor A's score) – 40 points

5.3 Cost Scoring

The scoring for costs will be based on the highest scoring vendor receiving the maximum score of 50 points. Each remaining vendor will receive a score based on a percentage of score of the highest scoring vendor. Note the following example.

- Vendor A scores 600 on cost – (80% of Vendor C's score) – 40 points
- Vendor B scores 700 on cost (93.3% of Vendor C's score) – 46.65 points
- Vendor C scores 750 on cost – 50 points

6 Terms and Conditions

6.1 Response Material Ownership

All material submitted regarding and in response to this RFP becomes the property of UTOPIA and will only be returned to the respondent at UTOPIA's option. Any person may petition to review responses after final selection has been made. UTOPIA has the right to use any or all system ideas presented in reply to this request, subject to limitations outlined below in "Proprietary Information." Disqualification of a respondent does not eliminate this right.

6.2 Proprietary Information

UTOPIA is subject to the disclosure requirements of the Government Records Access and Management Act ("GRAMA"), Title 63, Chapter 2, Utah Code Annotated. UTOPIA generally considers Agreements, Contract Documents and all accompanying material to be public and subject to disclosure. A written claim of confidentiality and a concise written statement of reasons supporting the claim must accompany any material considered by respondents to be proprietary. Blanket claims that the entire Agreement or Contract Documents are confidential will be denied by UTOPIA. UTOPIA cannot guarantee that any information will be held confidential. Under Section 63G-2-304 of the Government Records Access and Management Act, if a respondent makes a claim of confidentiality, UTOPIA, upon receipt of a request for disclosure, will determine whether the material should be classified as public or protected, and will notify the respondent of such determination. UTOPIA agrees to hold all information classified as protected in confidence and protect it from public disclosure in accordance with such statutes to the greatest extent permitted by Utah law. UTOPIA may disclose such information to the extent required by law; however, UTOPIA shall provide respondents prompt notice of a request for disclosure of such protected information and shall cooperate with respondents in seeking the issuance of a protective order.

Respondents are entitled under the Government Records Access and Management Act to appeal an adverse determination regarding the classification of information. UTOPIA is not required to notify respondents of a request for non-protected information and will not consider a claim of confidentiality unless the respondent's claim of confidentiality is made on a timely basis and in accordance with the Government Records Access and Management Act.

6.3 Conflicts of Interest

Proposed solutions to this RFP must be defined in such a way as to prevent and prohibit conflict of interest between the respondent, UTOPIA, and all potential service providers that may offer services across the UTOPIA network. Specifically, respondents must avow that they have no intention of offering services across the UTOPIA network, either in the short term or at any point in the future, or they must acknowledge their intent. Furthermore, respondents must disclose any relationships, either formal or informal, with companies that may at any time offer competitive retail services across the network.

If respondents intend to offer competitive retail services at any point across the UTOPIA network, you must provide a complete explanation of how your proposed solution to this RFP does not advantage you in any way over potential competitors. Failure to do so will result in your permanent disqualification from offering competitive retail services across the UTOPIA network.

7 RFP Acknowledgment Form

UTAH TELECOMMUNICATION OPEN INFRASTRUCTURE AGENCY (UTOPIA)

RE: RFP No. 2021ENG1

ACKNOWLEDGMENT OF RECEIPT FORM

In acknowledgment of receipt of this Request for Proposal the undersigned agrees that he/she has received a complete copy, beginning with the title page and table of contents, and ending with appendix A.

The acknowledgment of receipt should be signed and received by the UTOPIA Purchasing Agent **no later than 5:00 PM on May 10, 2021** (Email submissions are acceptable if the sender confirms receipt with the purchasing agent). Only potential Respondents who elect to return this form completed with the indicated intention of submitting a proposal will receive copies of all respondents written questions and UTOPIA's written responses to those questions as well as RFP amendments, if any are issued.

FIRM: _____

REPRESENTED BY: _____

TITLE: _____

PHONE (___)_____ FAX (___)_____Email _____

ADDRESS: _____

CITY: _____ STATE _____ ZIP:_____

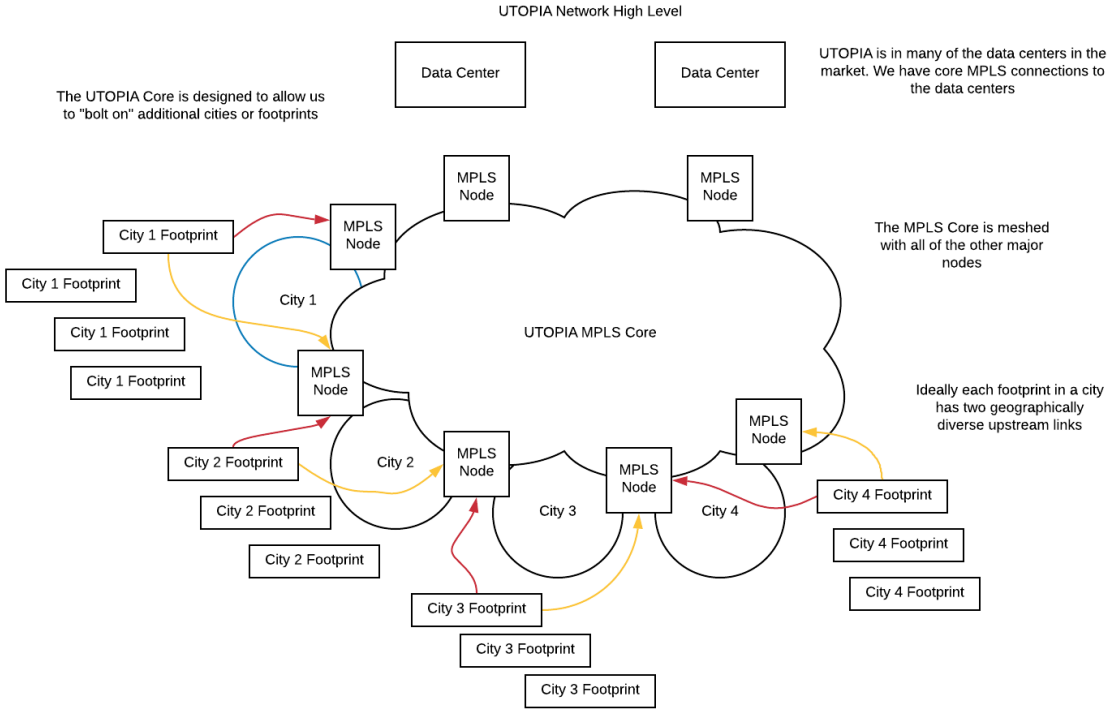
SIGNATURE: _____ DATE:_____

Firm's intention to respond to this Request for Proposals.
[ ] Does [ ] Does Not

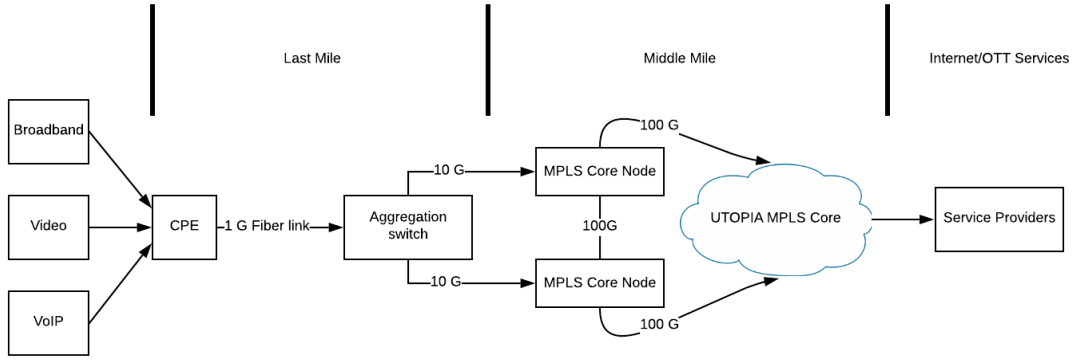
Return completed form to:

Jeff Meyer
Network Engineering Manager
jmeyer@utopiafiber.com

8 Appendix A – UTOPIA High Level Diagram



9 Appendix B – Role overview



Each customer has a dedicated fiber link to upstream switch. Services are delivered by service provider specific VLANs

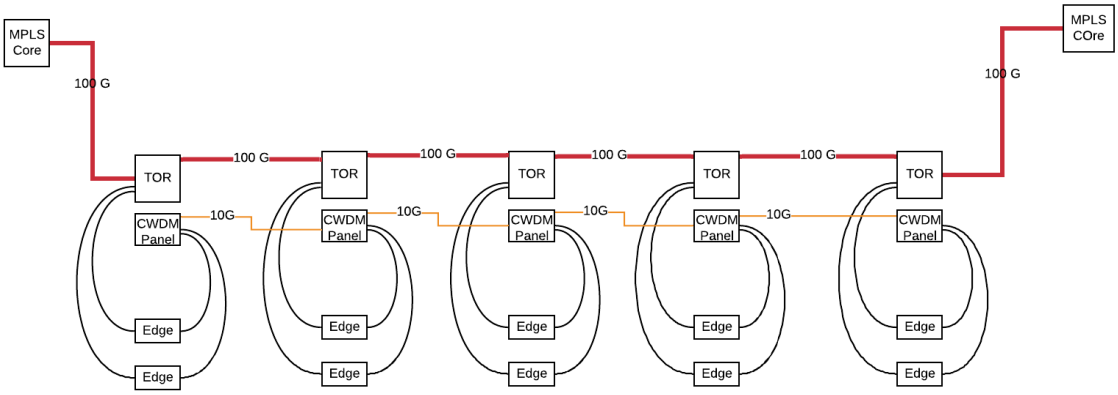
Aggregation switches have uplinks in LACP groups or MPLS interfaces allowing easy capacity upgrades. These are usually configured in an active/standby configuration. Additional switches can be added with their own dedicated uplink fibers to address increased subscriber take rates.

The IP/MPLS core is built with 100 G core links either with dedicated fiber between the nodes or with DWDM optical transport technologies to allow addtional 100 G waves to be added between nodes

10 Appendix C – 100G Top of Rack Switch Use Case

UTOPIA Top of Rack Switch Use case

Each footprint will have a 100G top of rack (TOR) switch with each edge switch having an uplink to the TOR switch. These edge switch connections will be 10G. The edge switch stacks will also have a link through CWDM panels to the next available TOR. There should also be limited capacity for 10G customers to connect directly to the TOR switch.



11 Appendix D – Port Isolation Overview