Massachusetts Technology Collaborative
Massachusetts Broadband Institute

Western Massachusetts

Call for Solutions

Ward Cunningham
Account Manager
Ciena Communications, Inc.
Email: wcunning@ciena.com
Phone: 978-489-2024

Eric Hoose
Sr. Systems Engineer
Ciena Communications, Inc.
Email: ehoose@ciena.com
Phone: 978-362-8073

Solution Cover Sheet

Name of Respondent Organization Ciena Communications, Inc.			
Mailing Address 1201 Winterson Road	**City/Town** Linthicum	**State** Maryland	**Zip Code** 21090
Telephone (410) 6940-5700	**Fax** (410) 694-5750	**Respondent Web Address** www.ciena.com	
Name of Primary Contact (Individual) Ward Cunningham			
Primary Contact Title Northeast Sales Director	**Contact e-mail address** wcunning@ciena.com	**Direct Telephone #** (508) 250-4446	

Which of the following best describes the respondent: (*You must select at least one*)

- ☐ **Broadband Service Provider**
- ☐ **Government Organization**
- • **Equipment Manufacturer**
- ☐ **Non-profit Organization**
- • **Equipment Vendor**
- ☐ **Owner of Physical Assets (please specify Asset: _____ _____**
- ☐ **Network or Systems Integrator**
- ☐ **Interested Individual**
- ☐ **Investor / Venture Capital**
- ☐ **Consultant**
- ☐ **Advocacy Group**
- ☐ **Other (please specify Other: _____ _____**

Brief Description of Organization
(please outline previous experience with broadband deployment and/or provision of broadband services)

Ciena Corporation is a global leader in communication network infrastructure, associated software and professional services. Our specialty is helping customers transition their networks for maximum value using innovative technology and market-driven solutions to address end-user demand. With expertise in optical, access and data networking, Ciena enables customers to deliver more services faster, lower the network cost base and improve the end-user experience. Our solutions form the foundation of many of the largest, most reliable and sophisticated service provider, cable/MSO, enterprise, government, and research and education networks across the globe.

Ciena specializes in high-performance network systems that enable reliable, secure connectivity for business continuance, disaster recovery and other mission-critical applications.

List of anticipated partner Organizations
Ciena is open to partnering with Consultants, Network and Facilities Management companies. This partnership would primarily be geared towards management, coordination and administration of a core optical network as supplied by Ciena.

Key Questions for Respondents

The Institute wishes to understand different conceptual approaches to solving the broadband availability problems in western Massachusetts, keeping in mind the stated goals and objectives listed above. Specifically, the MBI is interested in an approach that weighs any potential tradeoffs that may need to be made in meeting the stated goals and objectives. The "Solutions" should describe the most appropriate technical and business models that can meet these goals as well as clearly demonstrate the economic feasibility and sustainability. Respondents should articulate the following:

1.0 TECHNICAL MODEL AND APPROACH

1.1. What technical approach is most appropriate and why?
Ciena proposes a model whereby the Commonwealth provides a common, vendor neutral optical network. This network would consist of three primary components. The first is to contract with one or more fiber optic companies to install and maintain the underlying network over a long term period, typically 20+ years. The second component is to install an open, high capacity optical infrastructure with the ability to deliver any technology between a primary and secondary telecommunication point of presence (POP). Lastly, under-served communities will ultimately be served by a combination of wireless and wired connectivity. This will vary by region and change over time. The important consideration is the optical backbone's ability to handle network traffic reliably, scale as necessary, evolve as standards change and include full management & maintenance support.

1.2. What specific services and product offerings will be available beyond entry level, commercial Internet access (e.g. video, telephony)?
Specific services and product offerings will again vary by region and change over time. The important aspect is the underlying core network's ability to meet current and future traffic demands.

1.3. What service and speed levels are achievable with your conceptual approach?
Any and all speeds and feeds are supportable under this model.

2.0 BUSINESS MODEL AND APPROACH

2.1. What business models should be used or considered in the deployment of broadband?
Once the primary barrier to entry has been removed by providing low cost backhaul to POP's the business model for providing service to under-served communities can naturally evolve. Depending on end user concentration, SLG participation, geography, available infrastructure and funding – the market will determine the broadband model. To be sure – if backhaul is available to accept any

protocol and deliver it where necessary cost effectively then competition and services will prosper.

2.2. What conditions and services are necessary for a sustainable business model?
The conditions necessary to guarantee a sustainable business model is for the Commonwealth to sponsor the backbone network. Edge community service delivery will prosper under these conditions. The challenge will be to coordinate multiple edge technologies and inbound traffic demands onto the network. Although the Commonwealth may outsource the management of the network, oversight will be required on an ongoing basis to guide processes and procedures.

2.3. What are the implications of mandating that the Broadband Institute's expenditures be used to fund a network that is in part or whole available to other commercial providers at wholesale market pricing? How should those wholesale market prices be set?
The network can be divided into two segments; public and wholesale.

1.) **A public component enables a smaller ISP or service provider to send secure traffic over a shared optical network, leveraging economies of scale. *At this point this model would most likely be a VPN tunnel over a shared Ethernet infrastructure.* Price points would be spread over a larger base of users thus less expensive.**

2.) **A wholesale model would allow a larger carrier or ISP to secure dark fiber strands on the common optical backbone and "*light*" them to support their own network design. Upfront costs will be higher, but they will in turn recognize greater economies of scale over time. This two tiered model will enable both large and small users of the shared optical backbone to leverage the network with a business model best suited for their requirements.**

3.0 SERVICE AREA

3.1. Can your conceptual approach reach all un-served citizens in western Massachusetts?
Yes. Provided dark fiber access is terminated somewhere in the community, the optical network as proposed can accommodate all un-served individuals.

3.2. If your conceptual approach can not reach all un-served citizens of western Massachusetts, in what towns and areas would you expect to deploy a broadband network, and what percentage of households would you anticipate serving?
Service delivery will depend on the business models of ISP's, CLEC's and service providers on a per community basis. As long as there is high speed backhaul availability in the community it should make financial sense for an edge service provider to make the investment in local network infrastructure.

4.0 PARTNERSHIPS

4.1. Could your organization provide end-to-end services or would it partner with other organizations?
Ciena can provide end-to-end installation, maintenance and management of the proposed solution. We recommend further oversight from a 3rd party partner to support the coordination of moves, adds and changes since this will be a dynamic network.

4.2. How would you envision and arrange such partnerships?
The Commonwealth would retain a role in the administration of this core network primarily in setting guidelines, policies and procedures between edge service providers and public communications facilities.

4.3. What role should the Broadband Institute play with regard to inducing or enabling the formation of partnerships?
In a nutshell, make the investment in a true vendor neutral backbone infrastructure and allow partnerships/competition to flourish.

5.0 FINANCING

5.1. What long lived assets would it be appropriate for the state to invest in, and which privately owned assets will complement that state investment?
Long lived assets of most interest to Ciena are dark fiber and optical equipment. Dark fiber has a life expectancy of 20+ years. Optical hardware has an expected life cycle of 8+ years. Both can be enhanced and upgraded over time to extend their life expectancy.

5.2. What investment structure is appropriate and why?
Without an initial investment by the Commonwealth of fiber and a vendor neutral backbone the barrier to entry will be too high to spur further private investment or participation. Higher density communities will see most activity while the communities in most need of broadband will be ignored.

5.3. How and on what terms should the Broadband Institute structure the deployment of the publicly owned assets for use by participants?
This will take a deal of foresight. The Commonwealth will retain possession of the network for the benefit of all parties. One recommendation is to create an Advisory Board. The Board will set guidelines on pricing, responsibilities, costs, processes and procedures. Ciena recommends this board include the hardware manufacturer, network management partner, Commonwealth and representation from SLG, Public Safety, taxpayers, service providers, etc. We view the network management partner taking lead on recommendations with final decisions resting with The Commonwealth.

5.4. What is your perception of the Broadband Institute's financing structure for investing in and owning assets required to serve un-served areas of the Commonwealth?
We feel the primary goal is to reduce barriers to entry, then allow private enterprise to flourish. This will ultimately provide the most reliable, cost effective broadband for end customers since they will finally have options.

5.5. What other sources of capital are available to support your conceptual model? How much capital is required to implement the proposed conceptual approach?
Ciena does not have access to other sources of capital other than what is funded. Costs will be a combination of upfront hardware with additional recurring costs of management and maintenance. Further, environmental considerations such as space, power, temperature control and electricity are also required on an ongoing basis. Actual costs will depend on the size and scale of the network.

5.6. What experience do you have in raising capital from these alternative sources? **NA**

6.0 PUBLIC ROLE

6.1. How should the performance of the Broadband Institute's investments be monitored?
A detailed scope of work will be agreed upon in advance for the design, installation, maintenance and management. Once these criteria are achieved the project can be deemed a success.

6.2. What reporting requirements are appropriate for service providers?
Complete transparency and network reporting are available upon request from Ciena.

6.3. What public sector demand evaluation and stimulation efforts are appropriate?
Since the Ciena network will be funded by MBI in advance, demand/stimulation efforts are not required.

7.0 OTHER

7.1. What provisions should be included in the agreements to build the necessary infrastructure?
A detailed statement of work (SOW) should highlight mutual responsibilities. The public optical backbone cannot survive without the participation and support of the Commonwealth, edge service providers and individual communities. The SOW can be changed upon mutual agreement over time.

7.2. What provisions should be included in the agreements governing the use of the infrastructure?

This is truly up to MBI. Ideally, the model will be fully vendor neutral, accessible and fairly priced to all. The key will be setting fair expectations in advance as opposed to "*taking them as they come*".

7.3. What are the essential questions that must be resolved for the respondent so as to better inform them on the applicability of various solutions?

The true questions are:

- **What are initial investments?**
- **What are monthly recurring costs?**
- **What revenues can they expect from a given community?**

Ciena can address monthly recurring costs in conjunction with MBI – the rest is up to end users and edge service providers.

7.4. What are the non-financial constraints to network deployment?

The ability to design and construct dark fiber in a fashion that addresses community's bandwidth requirements, logistical network access and environmental constraints. Also critical will be The Commonwealth, LEC's, SLG and Public Safety support. Most of all the ability for all parties to work together will be critical.

7.5. What information can you provide to give the Institute a better understanding of where specifically broadband is currently available and where it is soon to be available?

Ciena does not have access to this information and would rely on dark fiber and/or service provider partners.

7.6. Are there other deployments or models used in other areas of the country or globe that could be applicable to the situation and challenges in western MA?

The network design as described is the current model for carriers to deliver broadband services nationwide. Most recently, a large regional carrier network has deployed Ciena optical equipment with a very similar geography and distributed customer demand. The idea was to create a resilient backbone with edge service delivery determined by end user density, available infrastructure and demand. Ciena looks forward to reviewing the concepts in this document in more detail and is firmly supportive of MBI's goal to bring broadband to under-served communities.