

STATE OF UTAH - STATE COOPERATIVE CONTRACT

CONTRACT NUMBER AR612

1. CONTRACTING PARTIES: This State Cooperative Contract is between the **Division of Purchasing and General Services (State)**, 3150 State Office Building, PO Box 141061, Salt Lake City, UT 84114-1061, an agency of the State of Utah, and the following CONTRACTOR:

<u>Ciena Communications, Inc.</u>	Name	
<u>5445 DTC Parkway, Suite 900</u>	Address	
<u>Greenwood Village</u>	<u>CO</u>	<u>80111</u>
<u>City</u>	<u>State</u>	<u>Zip</u>

LEGAL STATUS OF CONTRACTOR

- Sole Proprietor
 Non-Profit Corporation
 For-Profit Corporation
 Partnership
 Government Agency

Contact Person Steve Darflinger Phone #303-302-3432 Fax # 303-302-3401 Email sdarflin@ciena.com
Federal Tax ID# 52-2055579 Vendor #VC0000182098 Commodity Code #20458, 20464, 20621, 20623, 20659, 83833, 83800, 88332, 92000

2. GENERAL PURPOSE OF CONTRACT: The general purpose of this contract is to provide:

Data communication equipment and services. A detailed list of awarded categories and subcategories are included in Attachment B – Scope of Work

Ciena is authorized to provide equipment and services in the following categories:

- 5.2.4 Optical Networking
5.2.8 Switches

3. CONTRACT PERIOD: Effective date: June 1, 2014 Termination date: May 31, 2019 unless terminated early or extended in accordance with the terms and conditions of this contract. Renewal options (if any): N/A

4. PRICING AS PER THE ATTACHMENT C

PAYMENT TERMS: Net 30

DAYS REQUIRED FOR DELIVERY: Switches 30 days ARO, Optical Networking Category 60 days ARO, unless Contractor and Participating Entity agree in writing to a different delivery date ARO.

MINIMUM ORDER: N/A

FREIGHT TERMS: FOB Destination, Freight Prepaid

5. ATTACHMENT A: Standard Contract Terms and Conditions, State Cooperative Contract

ATTACHMENT B: Scope of Work

ATTACHMENT C: Product Offerings and Pricing

ATTACHMENT D: Vendor's Response to Solicitation JP14001. The parties hereby acknowledge and agree that any exceptions stated in attachment "D" – Vendor's Proposal Response have been removed and/or resolved between the parties. Any exception in attachment "D" are explicitly NOT a part of this contract.

Any conflicts between Attachment A and other Attachments will be resolved in favor of Attachment A. State specific Terms and Conditions will be found in the executed Participating Addendums, State Terms and

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Conditions in an executed Participating Addendum will take priority in the event of conflict between those terms and conditions and this Cooperative Contract.

6. DOCUMENTS INCORPORATED INTO THIS CONTRACT BY REFERENCE BUT NOT ATTACHED:
- a. All other governmental laws, regulations, or actions applicable to the goods and/or services authorized by this contract.
 - b. Utah State Procurement Code, Procurement Rules, CONTRACTOR'S response to Bid #JP14001 and JP14001-1 dated August 30, 2013 and December 2, 2013

IN WITNESS WHEREOF, the parties sign and cause this contract to be executed.

CONTRACTOR

STATE OF UTAH

Contractor's Signature

Date

Director, Div. of Purchasing & General Svs.

Date

Erik J. Lichter
Vice President & Associate General Counsel

Type or Print Name and Title

ATTACHMENT A – WSCA-NASPO Terms and Conditions



WSCA-NASPO Master Agreement Terms and Conditions

1. AGREEMENT ORDER OF PRECEDENCE:

The Master Agreement (as further defined in Section 34 below) shall consist of the following documents:

1. A Participating Entity's Participating Addendum ("PA");
2. WSCA-NASPO Master Agreement Terms and Conditions;
3. The Statement of Work;
4. The Solicitation; and
5. Contractor's response to the Solicitation.

These documents shall be read to be consistent and complementary. Any conflict among these documents shall be resolved by giving priority to these documents in the order listed above. Contractor terms and conditions that apply to this Master Agreement are only those that are expressly accepted by the Lead State and must be in writing and attached to this Master Agreement as an Exhibit or Attachment. No other terms and conditions shall apply, including without limitation, terms and conditions listed in the Contractor's response to the Solicitation, or terms listed or referenced on the Contractor's website, in the Contractor quotation/sales order or in similar documents subsequently provided by the Contractor.

2. AMENDMENTS The terms of this Master Agreement shall not be waived, altered, modified, supplemented or amended in any manner whatsoever without prior written approval of the WSCA-NASPO Contract Administrator and Contractor.

3. ASSIGNMENT/SUBCONTRACT Neither Contractor, a Participating Entity, nor WSCA-NASPO shall assign, sell, transfer, subcontract its total obligations, or sublet rights, or delegate its total responsibilities under this Contract, in whole or in part, except as expressly stated herein, without the prior written approval of the WSCA-NASPO Contract Administrator or Participating Entity as applicable, and Contractor, which approval will not be unreasonably withheld or delayed.

4. CANCELLATION The Master Agreement may be canceled by either party upon 60 days notice, in writing, prior to the effective date of the cancellation. Further, any Participating State may cancel its participation upon 30 days written notice, unless otherwise limited or stated in the special terms and conditions of this solicitation. Cancellation may be in whole or in part. Any cancellation under this

provision shall not affect the rights and obligations attending orders outstanding at the time of cancellation, including without limitation any right of the Purchasing Entity to indemnification by the Contractor, rights of payment for goods/services delivered and accepted, and rights attending any warranty or default in performance in association with any order. Cancellation of the Master Agreement due to Contractor default may be immediate.

On any cancellation termination or expiration under this Master Agreement, a Participating Addendum and/or purchase order(s), all accounts and payments will be processed according to the financial arrangements set forth herein for products delivered and/or approved services rendered to date of termination, and any provisions that by their nature are intended to survive, shall survive cancellation, expiration or termination of the Agreement and/or any Participation Addendum, as applicable.

Rights upon Termination or Expiration

1. Upon any cancellation, termination or expiration of this Master Agreement or a Participating Addendum, (a) Contractor reserves the right to cease all further delivery of product or services, and (b) all outstanding invoices become due and payable within thirty (30) days of termination. If Contractor agrees to complete delivery of any further products or services due against any existing accepted Purchase Orders, then Customer shall pay for such products or services in advance within thirty (30) days.
2. Except for a termination of this Master Agreement or a Participating Addendum or a purchase order(s) resulting from Customer's breach of Contractor's proprietary rights and software licensing, Confidential Information, or Export, Re-Export, Transfer and Use Controls, upon termination or expiration of this Contract, a) Customer may continue to use, in accordance with the terms and conditions of this Contract and for the Participating Addendum, products provided to it by Contractor prior to the date of termination or expiration provided (1) payment has been made in full for such products and (2) license rights allow for such continued use.
3. In the event of any termination pursuant to this section, and unless otherwise required by law or court of competent jurisdiction, Customer shall remain obligated to comply in perpetuity with the provisions of Contractor's Software License terms, and Confidential Information.

5. CONFIDENTIALITY, NON-DISCLOSURE AND INJUNCTIVE RELIEF

5.1 Confidentiality. Each party acknowledges that it and its employees or agents may, in the course of dealing under this Master Agreement, be exposed to or acquire information that may be deemed confidential, as follows. Any and all information of any form that is marked as confidential or would by its nature reasonably be deemed as confidential when obtained by the receiving party or its employees or agents (the "Receiving Party") in the performance of this Master Agreement, including without limitation, the following "Confidential Information": (a) any Participating Entity records, (b) personnel records, and (c) information concerning individuals, is confidential information of the disclosing party (the "Disclosing Party"). Any reports or other documents or items (including software) that result from the use of the Confidential Information shall for such portions of the reports/documents/items, be treated in the same manner as the Confidential Information. Confidential Information does not include information that (a) is or becomes (other than by disclosure by the Disclosing Party) publicly known; (b) is furnished by the Disclosing Party to others without restrictions similar to those imposed by this Master Agreement; (c) is rightfully in the Receiving Party's possession without the obligation of nondisclosure prior to the time of its disclosure under this Master Agreement; (d) is obtained from an independent source without the obligation of confidentiality, (e) is disclosed with the written consent of

Participating Entity or; (f) is independently developed by employees, agents or subcontractors of either party who can be shown to have had no access to the Confidential Information

Neither party shall disclose the Confidential Information to any third party, except that the receiving party may disclose Confidential Information to its employees, subcontractors, or Vendor's affiliates' employees and subcontractors only: (a) on a "need to know" basis, (b) consistent with the objectives of this Master Agreement, and (c) pursuant to separate written non-disclosure terms that contractually obligate such employees and subcontractors to maintain the confidentiality of the Confidential Information.

Notwithstanding termination of this Master Agreement as described herein, the obligations of the Receiving Party with respect to Confidential Information received prior to termination shall continue for three (3) years from the date the Confidential Information was received.

Customer agrees that aspects of the Software and associated Documentation, including the specific design and structure of individual programs, constitute trade secrets and/or copyrighted material of Contractor.

5.2 Non-Disclosure. The Receiving Party shall 1) hold Confidential Information in confidence, using at least the industry standard of confidentiality (but in any event no less than a reasonable standard of care), and 2) not to copy, reproduce, sell, assign, license, market, transfer or otherwise dispose of, give, or disclose Confidential Information to third parties or use Confidential Information for any purposes whatsoever other than the performance of this Master Agreement, and 3) to advise each of its employees and agents of their obligations to keep Confidential Information confidential. The Receiving Party shall use commercially reasonable efforts to assist the Disclosing Party in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limiting the generality of the foregoing, the Receiving Party shall advise the Disclosing Party as soon as practicable if the Receiving Party learns or has reason to believe that any Receiving Party employee or subcontractor person who has had access to Confidential Information has violated or has stated an intent to violate the terms of this Master Agreement and the Receiving Party shall at its expense cooperate with the Disclosing Party in seeking injunctive or other equitable relief in the name of the Disclosing Party against any such person. Except as directed by the Disclosing Party, the Receiving Party will not at any time during or after the term of this Master Agreement disclose, directly or indirectly, any Confidential Information to any person, except in accordance with this Master Agreement, and that upon termination of this Master Agreement or at the Disclosing Party's request, the Receiving Party shall turn over to the Disclosing Party all documents, papers, and other matter in the Receiving Party's possession that embody Confidential Information. Notwithstanding the foregoing, the Receiving Party may keep one copy of such Confidential Information necessary for quality assurance, audits and evidence of the performance of this Master Agreement.

5.3 Injunctive Relief. The parties acknowledge that breach of this Section, including disclosure of any Confidential Information, may cause irreparable injury to the Disclosing Party that is inadequately compensable in damages. Accordingly, the Disclosing Party may seek injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies that may be available. The Receiving Party acknowledges and agrees that the covenants contained herein are necessary for the protection of the legitimate business interests of Participating Entity and are reasonable in scope and content.

6. DEBARMENT The contractor certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in

this transaction (Contract) by any governmental department or agency. If the contractor cannot certify this statement, attach a written explanation for review by WSCA-NASPO.

7.A DEFAULTS & REMEDIES

- a. The occurrence of any of the following events ("default") shall be an event of default under this Master Agreement:
- i. Nonperformance of contractual requirements; or
 - ii. A breach of any material term or condition of this Master Agreement; or
 - iii. Any representation or warranty by Contractor in response to the solicitation or in this Master Agreement proves to be untrue or materially misleading; or
 - iv. Institution of proceedings under any bankruptcy, insolvency, reorganization or similar law, by or against a party, or the appointment of a receiver or similar officer for a party or any of its property, which is not vacated or fully stayed within thirty (30) calendar days after the institution or occurrence thereof; or
 - v. Any default specified in another section of this Master Agreement.
- b. Upon the occurrence of an event of default, the non-defaulting party, as applicable shall issue a written notice of default, identifying the nature of the default, and providing a period of sixty (60) calendar days in which defaulting party shall have an opportunity to cure the default. The non-defaulting party shall not be required to provide advance written notice or a cure period and may immediately terminate this Master Agreement in whole or an Attachment B category if the non-defaulting party, in its sole discretion, determines that it is reasonably necessary to preserve public safety or prevent immediate public crisis. Time allowed for cure shall not diminish or eliminate the liability for damages.

Participating Addendum: If either party to a Participating Addendum (including the Lead State when acting in its sovereign capacity under this Master Agreement) materially breaches any of the provisions of a Participating Addendum, the non-breaching party may terminate the Participating Addendum as follows: (a) immediately upon providing written notice to the breaching party if the breach is not capable of being (b) cured, and (b) sixty (60) calendar days after providing written notice to the breaching party if the breaching party fails to cure such breach within such period. Notwithstanding the foregoing, a Participating Addendum may be terminated immediately by Contractor for cause in the event of Purchaser's breach of the provisions relating to Software License or Confidential Information.

The cure periods stated in the above paragraphs shall not apply to any failure(s) to perform that result from the willful or negligent acts or omissions of the aggrieved party

- c. If a party is notified with sufficient specifics of the default and afforded an reasonable opportunity to cure and fails to cure the default within the period specified in the written notice of default, the breaching party shall be in breach of its obligations under this Master Agreement and the non-defaulting party respectively shall have the right to exercise any or all of the following remedies:
- i. Exercise any remedy provided by law; and
 - ii. Terminate this Master Agreement, and/or any related Participation Agreement; and
 - iii. (Reserved); and
 - iv. Suspend Contractor from receiving future bid solicitations; and
 - v. Suspend performance relating to the notice; and

vi. Withhold payment for the specific product/Services causing the notice until the i) default is remedied or ii) termination, whichever is earlier.

d. In the event of a default under a Participating Addendum, a party shall provide a written notice of default as described in this section and have all of the rights and remedies under this paragraph regarding its participation in the Master Agreement, in addition to those set forth in its Participating Addendum.

7.B LIMITATION OF LIABILITY

7.B Limitation of Liability. Except for those obligations under Intellectual Property Infringement General Indemnity, notwithstanding anything else herein, all liability of Contractor and its suppliers to any Participating Entity for claims arising under this Agreement, the applicable Participating Addendum, or otherwise shall be limited to two million dollars (\$2,000,000). This limitation of liability is cumulative and not per incident.

EXCEPT WITH RESPECT TO OBLIGATIONS RELATIVE TO SOFTWARE LICENSE AND CONFIDENTIALITY, NEITHER PARTY SHALL BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM OR ARISING OUT OF THIS AGREEMENT, INCLUDING LOST PROFITS, COST OF CAPITAL, COST OF SUBSTITUTE FACILITIES OR EQUIPMENT, DOWNTIME COSTS, LOST OR DAMAGED DATA (EXCEPT FOR A LOSS OF PURCHASER DATA CAUSED BY CONTRACTOR'S NEGLIGENCE), OR CLAIMS OF CUSTOMERS, WHETHER OR NOT SUCH PARTY HAD BEEN ADVISED, KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING ANY OTHER PROVISION OF THE AGREEMENT.

8.A ORDERING 8.A.1. Contractor reserves the right to require that purchases be made through

Fulfillment Partners pursuant to Section 8.B "AUTHORIZED RESELLERS". Where so required by Contractor, Purchasers shall not order Products or Services directly from Contractor and shall order same from Fulfillment Partner. Only Purchaser may issue purchase orders, and if so, shall purchase products by issuing a written or electronic Purchase Order (pursuant to Section 32 "WSCA-NASPO eMARKET CENTER" below once established or by email to Authorized Resellers pursuant to Section 8.B "AUTHORIZED RESELLERS"; or if to Contractor, via email to Contractor in accordance with Contractor's order entry instructions, unless another electronic format (e.g., eBusiness or web-based) is mutually agreed upon; respectively), signed or (in the case of electronic transmission) sent by its authorized representative, indicating specific products (including part numbers and descriptions,) services, quantity, unit price, total purchase price, shipping instructions, requested delivery dates, bill-to and ship-to addresses, tax exempt certifications, if applicable, Participation Agreement and Master Agreement reference; reference to quote or statement of work, as applicable, and any other special instructions. Each order placed and accepted hereunder will be deemed to constitute a separate agreement, incorporating the terms and conditions hereof, between Contractor and the entity placing the order, with such entity being deemed "Buyer" for purposes of this Agreement.

8. A.2 Any contingencies on Purchaser's Purchase Orders are not binding upon Contractor. The terms and conditions of this Master Agreement and applicable Participating Addendum prevail, regardless of any additional or conflicting terms on the Purchase Order, or other correspondence from Purchaser to Contractor and any additional or conflicting terms are deemed rejected by Contractor unless Contractor has expressly agreed to such terms in writing. Mere acceptance or processing of a

Purchase Order, Order, or Order Document containing such terms shall not constitute such express consent.

8. A.3 All Purchase Orders are subject to Contractor's reasonable acceptance (including performing any related credit checks). Contractor shall use commercially reasonable efforts to accept or reject orders in writing within ten (10) days from receipt. No purchase order will be binding on Contractor until Contractor accepts it in writing which writing shall be within the foregoing timeframes.
8. A.4 Purchaser may defer product shipment up to thirty (30) days from the originally scheduled shipping date, provided written notice is received by Contractor at least ten (10) business days before the originally scheduled shipping date. Cancelled orders, rescheduled deliveries, or product configuration changes made by Purchaser less than ten (10) days before the original shipping date are subject to Contractor's acceptance and a charge of fifteen percent (15%) of the total invoice amount relating to the affected Product(s). Contractor reserves the right to reschedule delivery due to configuration changes made within ten (10) business days of scheduled shipment. No cancellation shall be accepted by Contractor where products are purchased with implementation services, including but not limited to design, customization, or installation services, except as may be set forth in the agreement or Statement of Work under which the services are to be rendered. Notwithstanding anything to the contrary, if Contractor is delayed in shipping the product due to Contractor fault for thirty (30) days or more from the original shipping date, the Customer may cancel the order without charge. The parties may, by mutual agreement, make changes to a purchase order. The party asking for a change shall describe in writing the details of the requested change. Contractor shall provide in writing to Buyer a summary of any and all adjustments to the charges and other changes resulting from the Change Order Request. In no event shall any change be effective or acted upon in any way until such time as (i) an authorized representative of each party has agreed to the terms of the Change Order Request in writing and (ii) Contractor has received a purchase order from Buyer for any additional charges resulting from the Change Order Request.
8. A.5. Services. Purchaser may place Purchase Orders for the various services offered by Contractor. The provision of any such services, if accepted by Contractor, shall be subject to the terms and conditions set forth in this Agreement, including the Master Services Annex attached hereto as Exhibit 2, as well as the then-current terms of service offerings set forth on Contractor's eMarket website and/or quote. Contractor reserves the right to subcontract services to a third party maintenance organization to provision services for Purchaser.
8. A.6. All stated prices are exclusive of any truces, fees, and duties or other similar amounts, however designated, and including without limitation value added, sales and withholding taxes which are levied or based upon such prices, charges, or upon this Master Agreement. Purchaser will pay sales and use taxes, if any, imposed on the Products and Services acquired under this Master Agreement, or furnish proof of its tax-exempt status upon request. Contractor will pay all other taxes based on Contractor's income or gross receipts, or personal property taxes levied or assessed on Contractor's personal property. In the event that the Purchaser is exempt from property and sales taxes, it will not be charged same.
8. A.7. Notwithstanding anything contained in the Master Agreement to the contrary, modifications which Contractor deems necessary to comply with specifications, changed safety standards or governmental regulations, to make the product non-infringing with respect to any patent, copyright, or other proprietary interest, or to otherwise improve the product may be made at any time by Contractor without prior notice to or consent of Purchaser or WSCA, and such altered product shall be deemed fully conforming. Contractor shall employ commercially reasonable

efforts to announce, including by electronic posting, product discontinuance or changes other than those set forth in the previous sentence in accordance with Contractor's End-of-Life Policy (EOL), which is as follows. Purchaser may make a last-time purchase of such products as set forth in such policy:

8.A.7.1 Software Lifecycle. Software is Generally Available for licensing hereunder for a minimum of twenty-four (24) months and is supported by Vendor (either under its warranty obligations hereunder or pursuant to Maintenance Services purchased by Buyer hereunder) for a minimum of thirty-six (36) months. Vendor shall, via the issuance of a Software change bulletin, provide Buyer with six (6) months advance notice of the End of Sale (EoS) and twelve (12) months advance notice of the EoL of a Software release. EoL means support for EoS Software is limited to recovery and restoration type of Services.

8.A.7.2 Hardware MD. Vendor shall provide twelve (12) months written notice, via its Product bulletins, prior to declaring Hardware manufacture discontinued ("MD"). Buyer will be provided with the opportunity to purchase such Hardware as a "last time buy" at least six (6) months prior to such Hardware reaching its MD date. EoL means that repair support for MD Hardware is not generally available (exception basis only).

8.B DISCOUNTS AND PRICING. Pricing for the WSCA-NASPO Master Agreements shall be based on the percent discount off the current global MSRP Schedule applicable to United States customers as specified in Attachment C. The Contractors discount rate shall remain in effect for the term of the WSCA-NASPO Master Price Agreement. In the event of a price decrease in any category of product at any time during the contract in a Provider's Price Schedule, including renewal options, the WSCA-NASPO Contract Administrator shall be notified immediately. All Price Schedule price reductions shall be effective upon the notification provided to the WSCA-NASPO Master Agreement Administrator.

8.C DELIVERY

8.C.1 Shipping terms are FOB destination, shipping and handling prepaid by Contractor. The method of shipment shall be consistent with the nature of the products and hazards of transportation. Title and risk of loss shall pass to Customer upon delivery.

8.C.2 If Customer requests delivery of products to Customer's forwarding agent or other representative, Customer assumes responsibility for compliance with applicable export laws and regulations.

8.C.3 Contractor is not liable for damage or penalty for delay in delivery or for failure to give notice of delay. Contractor shall not have any liability in connection with product shipment other than as set forth in this Section.

8.C.4 All sales are final. Except as provided in Contractor's Limited Warranty, Contractor only permits the return of un-opened products due to Contractor's shipping or order processing error, or damage in transit. No other returns are authorized under this Master Agreement. Warranty returns will not be subject to any restocking charges

8.C.5 Orders, deliveries and use are limited to United States sites in the states, US territories, and District of Columbia (subject to execution of the respective, mutually agreed upon Participation Addendum). Products will not be moved to outside of such United States sites.

9. FORCE MAJEURE Neither party to this Master Agreement shall be held responsible for delay or default (except failure to pay) or delay (including without limitation to failure to pay within the times set

forth in this Agreement, provided payment is later made within a reasonable time) caused by fire, riot, acts of God and/or war which is beyond that party's reasonable control. In the event of such excusable delay, the affected Party shall promptly notify the other Party in writing of such delay and an equitable adjustment shall be made in the completion schedules and any other affected terms of this Agreement. WSCA-NASPO may terminate this Master Agreement after determining such delay or default will reasonably prevent successful performance of this Master Agreement and after considering Contractor's plan for performance after a force majeure event.

10. GOVERNING LAW This procurement and the resulting agreement shall be governed by and construed in accordance with the laws of the state sponsoring and administering the procurement. The construction and effect of any Participating Addendum or order against the Master Agreement(s) shall be governed by and construed in accordance with the laws of the Participating Entity's State. Venue for any claim, dispute or action concerning an order placed against the Master Agreement(s) or the effect of an Participating Addendum shall be in the Purchasing Entity's State.

11. INDEMNIFICATION

Each party to this Agreement shall defend, indemnify, and hold harmless the other, its corporate affiliates and their respective officers, directors, employees, and agents and their respective successors and assigns from and against any and all claims, losses, liabilities, damages, and expenses (including, without limitation, reasonable attorneys' fees, including without limitation those based on contract or tort, arising out of or in connection with a claim, suit, or proceeding brought by a third party based upon bodily injury (including death) or damage to tangible personal property (not including lost or damaged data) arising from the negligent or intentional acts or omissions of the indemnifying party or its subcontractors, or the officers, directors, employees, agents, successors, and assigns of any of them. In the event that the indemnified party's or a third party's negligent or intentional acts or omissions contributed to cause the injury or damage for which a claim of indemnity is being asserted against the indemnifying party hereunder, the damages and expenses (including, without limitation, reasonable attorneys' fees) shall be allocated or reallocated, as the case may be, between the indemnified party, the indemnifying party, and any other party bearing responsibility in such proportion as appropriately reflects the relative fault of such parties, or their subcontractors, or the officers, directors, employees, agents, successors, and assigns of any of them, and the liability of the indemnifying party shall be proportionately reduced.

The foregoing indemnification obligations are conditioned upon the indemnified party promptly notifying the indemnifying party in writing of the claim, suit, or proceeding for which the indemnifying party is obligated under this Subsection, cooperating with, assisting, and providing information to, the indemnifying party as reasonably required, and granting the indemnifying party the exclusive right to defend or settle such claim, suit, or proceeding; provided that any such settlement or compromise includes a release of the indemnified party from all liability arising out of such claim, suit or proceeding.

12 INDEMNIFICATION - INTELLECTUAL PROPERTY

12.1 Contractor will have the obligation to defend any claim, action, suit, or proceeding ("IPR Claim") brought against Purchaser so far as it is based on a claim that any product supplied under this Master Agreement infringes Third Party IPR (as defined below). Contractor will indemnify Purchaser against any final judgment entered in respect of such an IPR Claim by a court of

- competent jurisdiction and against any settlements arising out of such an IPR Claim Contractor's obligations to defend the IPR Claim and indemnify the Purchaser are conditional upon:
- 12.1.1 Purchaser notifying Contractor promptly in writing of the IPR Claim or threat thereof;
 - 12.1.2 Purchaser giving Contractor full and exclusive authority for the conduct of the defense and settlement of the IPR Claim and any subsequent appeal; and
 - 12.1.3 Purchaser giving Contractor all information and assistance reasonably requested by Contractor in connection with the conduct of the defense and settlement of the IPR Claim and any subsequent appeal.
- 12.2 For the purposes of this Master Agreement, "Third Party IPR" means a United States copyright existing as at the date of order or a United States patent issued as at the date of order.
- 12.3 If an IPR Claim has been made, or in Contractor's reasonable opinion is likely to be commenced, Purchaser agrees to permit Contractor, at its option and expense, either to: (a) procure for Purchaser the right to continue using the product; (b) replace or modify the product so that it becomes non-infringing; or (c) immediately terminate both parties' respective rights and obligations under this Master Agreement with regard to the product, in which case Purchaser will return the product to Contractor and Contractor will refund to Purchaser the price originally paid by Purchaser to Contractor for the product, as depreciated or amortized by an equal annual amount over three (3) years from date of original shipment.
- 12.4 Notwithstanding the foregoing, Contractor has no liability for, and Purchaser will defend and indemnify Contractor against, any IPR Claim arising from:
- 12.4.1 the combination, operation, or use of a product supplied under this Master Agreement with any product, device, or software not supplied by Contractor;
 - 12.4.2 a Claim that asserts damages based upon the amount or duration of use which Purchaser makes of the product, revenue earned by Purchaser from services it provides which utilize the product, or services offered by Purchaser to external or internal customers;
 - 12.4.3 the alteration or modification of any product supplied under this Master Agreement from and after the date such product is so supplied and such alteration or modification is not made by Contractor;
 - 12.4.4 Contractor's compliance with Purchaser's designs, specifications, or instructions;
 - 12.4.5 Purchaser's use of the product after Contractor has informed Purchaser of modifications or changes in the product required to avoid such an IPR Claim if the alleged infringement would have been avoided by implementation of Contractor's recommended modifications or changes;
 - 12.4.6 Purchaser's use of a non-current release of Hardware or Software when Contractor has made a newer release made available of the Hardware or Software that resolves the infringement and Purchaser is notified in writing of such and declines to use it; or
 - 12.4.7 improper use of the Hardware or Software or use outside the scope of the Documentation or RTU License.

THIS SECTION STATES THE ENTIRE OBLIGATION OF CONTRACTOR AND ITS SUPPLIERS, AND THE EXCLUSIVE REMEDY OF PURCHASER, IN RESPECT OF ANY INFRINGEMENT OR ALLEGED INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS OR PROPRIETARY RIGHTS. THIS INDEMNITY OBLIGATION AND REMEDY ARE GIVEN TO PURCHASER SOLELY FOR ITS BENEFIT AND IN LIEU OF, AND CONTRACTOR DISCLAIMS, ALL WARRANTIES, CONDITIONS, AND OTHER TERMS OF NON-INFRINGEMENT WITH RESPECT TO ANY PRODUCT.

13. INDEPENDENT CONTRACTOR The contractor shall be an independent contractor, and as such shall have no authorization, express or implied to bind WSCA-NASPO or the respective states to any agreements, settlements, liability or understanding whatsoever, and agrees not to perform any acts as agent for WSCA-NASPO or the states, except as expressly set forth herein.

14. INDIVIDUAL CUSTOMER Except to the extent modified by a Participating Addendum, each Participating Entity shall follow the terms and conditions of the Master Agreement and applicable Participating Addendum and will have the same rights and responsibilities for their purchases as the Lead State has in the Master Agreement, including but not limited to, any indemnity or to recover any costs allowed in the Master Agreement and applicable Participating Addendum for their purchases. Each Participating Entity is responsible for its own charges, fees, and liabilities. The Contractor will apply the charges and invoice each Participating Entity individually.

15. INSURANCE Contractor shall, during the term of this Master Agreement, maintain in full force and effect, the insurance described in this section. Contractor shall acquire such insurance from an insurance carrier or carriers licensed to conduct business in the Participating Entity's state and having a rating of A-, Class VII or better, in the most recently published edition of Best's Reports. Failure to buy and maintain the required insurance may result in this Master Agreement's termination or at a Participating Entity's option, result in termination of its Participating Addendum.

Coverage shall be written on an occurrence basis. The limits shall be as indicated below, with no deductible for each of the following categories:

- a) Commercial General Liability covering the risks of bodily injury (including death), property damage and personal injury, including coverage for contractual liability, with a limit of \$1 million per occurrence/\$2 million general aggregate;
- b) Contractor must comply with any applicable State Workers Compensation or Employers Liability Insurance requirements.

Contractor shall pay premiums on all insurance policies.

Prior to commencement of the work, Contractor shall provide to the Participating Entity a written endorsement to the Contractor's general liability insurance policy that (i) names the Participating Entity as an additional insured, but only to the extent of liabilities falling within Contractor's indemnity obligations pursuant to the terms of this Master Agreement, and (ii) provides that the Contractor's liability insurance policy shall be primary, with any liability insurance of the Participating Entity as secondary and noncontributory.

Contractor shall furnish to Participating Entity copies of certificates of all required insurance within thirty (30) calendar days of the Participating Addendum's effective date and prior to performing any work. Copies of renewal certificates of all required insurance shall be furnished within thirty (30) days after renewal date. These certificates of insurance must expressly indicate compliance with each and every insurance requirement specified in this section. Failure to provide evidence of coverage may, at State's sole option, result in this Master Agreement's termination. In addition, should any of the required insurance be cancelled or non-renewed, Contractor shall immediately replace such insurance and provide to Participating Entity a certificate of insurance evidencing the replacement insurance.

Coverage and limits shall not limit Contractor's liability and obligations under this Master Agreement.

16. LAWS AND REGULATIONS Any and all performance, and supplies, services and equipment offered and furnished hereunder, shall comply fully with all applicable Federal and State laws and regulations.

17. LICENSE OF PRE-EXISTING INTELLECTUAL PROPERTY

17.1 License. Conditioned upon compliance with the terms and conditions of the license granted herein or as represented in Contractor's End User License Agreement, Contractor grants to Customer a nonexclusive and nontransferable license to use solely on the Hardware for which it is designated, and for its intended purposes as set forth in the applicable Documentation for Customer's internal business purposes the Software and the Documentation for which Customer has paid the required license fees, subject to the terms herein.

Customer's license to use the Software shall be limited to, and Customer shall not use the Software in excess of, a single hardware chassis or card or any applicable authorized usage levels or license grants as set forth in the applicable Purchase Order which has been accepted by Contractor and for which Customer has paid to Contractor the required license fee.

Unless otherwise expressly provided in the Documentation, Customer shall use the Software solely as embedded in, for execution on, or (where the applicable Documentation permits installation on non-Contractor equipment) for communication with Contractor equipment owned by Customer and used for Customer's internal business purposes. For evaluation or beta copies for which Contractor does not charge a license fee, the above requirement to pay license fees does not apply. If any Software is subject to a free or open source license that provides the end user with rights to use, copy or modify a software program that are broader than the RTU License above, then such rights shall take precedence.

17.2 General Limitations. This is a license, not a transfer of title, to the Software and Documentation, and Contractor retains ownership of all copies of the Software and Documentation. No transaction regarding Software hereunder shall be deemed a sale of goods. Customer acknowledges that the Software and Documentation contain trade secrets of Contractor, its suppliers or licensors, including but not limited to the specific internal design and structure of individual programs and associated interface information. Accordingly, except as otherwise expressly provided under this Agreement, Customer shall have no rights to the Software or Documentation except as expressly granted herein; Contractor and its licensors (as applicable) retain all right, title and interest in the Software and Documentation and any derivative works or copies thereof. All copyrights, patents, trade secrets, or other intellectual property rights associated with any change or improvement to the Hardware and/or Software, and ideas, concepts, techniques, inventions, processes, or works of authorship related to the Hardware and/or Software developed or created by Contractor or Buyer or its personnel shall belong exclusively to Contractor. Customer specifically agrees not to:

17.2.1 transfer, assign or sublicense its license rights to any other person or entity, or use the Software on unauthorized or secondhand Contractor equipment, and Customer acknowledges that any attempted transfer, assignment, sublicense, or use shall be void;

17.2.2 make error corrections to or otherwise modify or adapt the Software or create derivative works based upon the Software, or permit third parties to do the same;

17.2.3 reverse engineer or decompile, decrypt, disassemble, or otherwise reduce the Software to human-readable form, except to the extent otherwise expressly required under applicable law notwithstanding this restriction;

17.2.4 use or permit the software (other than embedded in the product) to be used to perform services for third parties, whether on a service bureau or time sharing basis or otherwise, without the express written authorization of Contractor; or

17.2.5 except and to the extent expressly required by a Participating State's applicable records laws or final court order (provided that the Participating State provides: (1) prior written notice to Contractor of such obligation and (2) the opportunity to oppose such disclosure, provision, or otherwise making available), disclose, provide, or otherwise make available trade secrets contained within the Software and Documentation in any form to any third party without the prior written consent of Contractor. Customer shall implement reasonable security measures to protect such trade secrets.

To the extent required by law, and at Customer's written request, Contractor shall provide Customer with the interface information needed to achieve interoperability between the Software and another independently created program, on payment of Contractor's applicable fee, if any. Customer shall observe strict obligations of confidentiality with respect to such information and shall use such information in compliance with any applicable terms and conditions upon which Contractor makes such information available.

17.3 Software, upgrades/updates, and additional copies.

NOTWITHSTANDING ANY OTHER PROVISION OF THIS MASTER AGREEMENT: (1) CUSTOMER HAS NO LICENSE OR RIGHT TO USE ANY ADDITIONAL COPIES OR UPGRADES UNLESS CUSTOMER, AT THE TIME OF ACQUIRING SUCH COPY OR UPGRADE, ALREADY HOLDS A VALID LICENSE TO THE ORIGINAL SOFTWARE AND HAS PAID THE APPLICABLE FEE FOR THE UPGRADE OR ADDITIONAL COPIES; (2) USE OF UPGRADES IS LIMITED TO CONTRACTOR EQUIPMENT FOR WHICH CUSTOMER IS THE ORIGINAL END USER PURCHASER OR WHO OTHERWISE HOLDS A VALID LICENSE TO USE THE SOFTWARE WHICH IS BEING UPGRADED; AND (3) THE MAKING AND USE OF ADDITIONAL COPIES IS LIMITED TO NECESSARY BACKUP PURPOSES ONLY.

17.4 Proprietary Notices. Customer agrees to maintain and reproduce all copyright and other proprietary notices on all copies, in any form, of the Software in the same form and manner that such copyright and other proprietary notices are included on the Software. Except as expressly authorized in this Agreement, Customer shall not make any copies or duplicates of any Software without the prior written permission of Contractor.

17.5 Term and Termination of License. This license granted herein shall remain effective until terminated. Customer may terminate the license at any time by destroying all copies of Software and any Documentation except as to the minimum number of copies required by law to keep for archival records purposes only. Customer's rights under this license will terminate immediately if Customer fails to comply with a) any material provision of this license and Contractor will give Customer notice of such non-compliance; and/or b) for any other provision of this license, effective upon ten (10) days of Buyer's receipt of a reasonably detailed written request to cure, and Buyer has not cured all breaches of the RTU License limitations or restrictions. Upon termination, Buyer shall destroy all copies of Software and Documentation in its possession or control, pay all Fees outstanding according to the terms of the Master Agreement and relevant Participation Agreement, and certify compliance with all obligations in this paragraph to Contractor in writing.

17.6 Customer Records. Customer grants to Contractor and its independent accountants the right to examine Customer's books, records, and accounts during Customer's normal business hours to verify compliance with this license. In the event such audit discloses non-compliance with this license, Customer shall promptly pay to Contractor the appropriate license fees, plus the reasonable cost of conducting the audit. In all other circumstances, the audit fees shall be paid by Contractor. Buyer

agrees to maintain and make available to Ciena within ten (10) days of request in writing, an accurate record of the whereabouts of the Software and any backup copy.

18. NO WAIVER OF SOVEREIGN IMMUNITY In no event shall this Master Agreement, any Participating Addendum or any contract or any purchase order issued thereunder, or any act of a Lead State or a Participating Entity, be a waiver by the Participating Entity of any form of defense or immunity, whether sovereign immunity, governmental immunity, immunity based on the Eleventh Amendment to the Constitution of the United States or otherwise, from any claim or from the jurisdiction of any court.

If a claim must be brought in a federal forum, then it must be brought and adjudicated solely and exclusively within the United States District Court for the Participating State. This section applies to a claim brought against the Participating State only to the extent Congress has appropriately abrogated the Participating State's sovereign immunity and is not consent by the Participating State to be sued in federal court. This section is also not a waiver by the Participating State of any form of immunity, including but not limited to sovereign immunity and immunity based on the Eleventh Amendment to the Constitution of the United States.

19. ORDER NUMBERS Purchase order numbers shall be clearly shown on all purchase order acknowledgements, shipping labels, packing slips, and invoices. The Master Agreement shall be shown on invoices.

20 PARTICIPANTS WSCA-NASPO is the cooperative purchasing arm of the National Association of State Procurement Officials. It is a cooperative group contracting consortium for state government departments, institutions, agencies and political subdivisions (e.g., colleges, school districts, counties, cities, etc.,) for all 50 states, the District of Columbia and the organized US territories. Obligations under this Master Agreement are limited to those Participating States who have signed a Participating Addendum where contemplated by the solicitation. Participating States incur no financial obligations on behalf of political subdivisions. Unless otherwise specified in the solicitation, the resulting award(s) might be or might not be exclusive to Contractor.

Purchaser under a Participating Addendum shall have no liability to Contractor beyond funds that are appropriated and made available to the Purchaser by the applicable legislative body. If sufficient funds are not appropriated by legislative action to a Purchaser as to any future period, Purchaser may terminate its Order(s) prospectively as to such future performance impacted by and to the extent of non-appropriation, or otherwise work with Contractor to arrive at a mutually acceptable resolution of the situation. Purchaser shall notify Contractor in writing of such non-appropriation within thirty (30) calendar days of final legislative action.

21. ENTITY PARTICIPATION Use of specific WSCA-NASPO cooperative Master Agreements by state agencies, political subdivisions and other entities (including cooperatives) authorized by individual state's statutes to use state contracts are subject to the approval of the respective State Chief Procurement Official. Issues of interpretation and eligibility for participation are solely within the authority of the respective State Chief Procurement Official.

22. PAYMENT

Upon and subject to credit approval by Contractor, payment is net thirty (30) days from invoice date. Buyer will notify Contractor of disputes within 20 days of invoice receipt.

Invoices for products ordered shall be rendered by Contractor on or after the date of delivery of such products to the Purchaser. Contractor may invoice Buyer for a) maintenance and support Services annually in advance; and b) all other Services upon completion of the Service or any discrete element thereof, however if such other Service continue beyond thirty (30) days, Contractor may elect to invoice Buyer at the end of each month for Services performed in that month.

If, at any time, Purchaser is delinquent in payment, or is otherwise in breach of this contract, Contractor may, without prejudice to other rights, withhold shipment (including partial shipments) of any order or performance of Service or require Purchaser to prepay for further shipments. Any sum not paid by Purchaser when due shall bear interest until paid at a rate of 1 percent per month (12 percent per annum) or the maximum legal rate, whichever is less. Purchaser grants Contractor a security interest in products purchased under this contract to secure payment for those products purchased which security interest shall expire upon full payment in accordance with the terms. If requested by Contractor, Purchaser agrees to execute financing statements to perfect this security interest. Payments may be made via a State or political subdivision "Purchasing Card" to Fulfillment Partners under this Contract.

23. PUBLIC INFORMATION This Master Agreement and all related documents are subject to disclosure pursuant to the Participating Entity's public information laws.

24. RECORDS ADMINISTRATION AND AUDIT The contractor will maintain, or require the maintenance of all records necessary to properly account for the payments made to the contractor for costs authorized by this Master Agreement. These records will be retained by the contractor for at least four years after the Master Agreement terminates, or until all audits initiated within the four years have been completed, whichever is later. The contractor agrees to allow WSCA-NASPO, State and Federal auditors, and state agency staff access to all such records of this Master Agreement and any order placed under this Master Agreement, for audit and inspection, and monitoring of services. Such access will be 1) with at least ten (10) business days advance written notice, during normal business hours, 3) shall not unduly interrupt or interfere with Contractor's normal business operations, and 4) in the event that such audit is conducted by a third party, such third party shall, prior to conducting such audit, execute a confidentiality agreement for the benefit of Contractor in a form reasonably satisfactory to Contractor. Buyer will regularly back up its data and files in accordance with good computing practices.

25. REPORTS and ADMINISTRATIVE FEES The contractor shall submit quarterly reports to the WSCA-NASPO Contract Administrator showing the quantities and dollar volume of purchases by each participating entity.

The contractor must pay a WSCA-NASPO administrative fee of one quarter of one percent (.25%) in accordance with the terms and conditions of this Master Agreement. The WSCA-NASPO administrative fee shall be submitted quarterly and is based on sales of products and services. The WSCA-NASPO administration fee is not negotiable. This fee was included as part of the pricing submitted with proposal.

Additionally, some States may require that an additional fee be paid directly to the State on purchases made by procuring entities within that State. For all such requests, the fee level, payment method and schedule for such reports and payments will be incorporated in a Participating Addendum that is made a part of this Master Agreement. The contractor may adjust the Master Agreement pricing accordingly for

purchases made by procuring agencies within the jurisdiction of the State. All such agreements may not affect the WSCA-NASPO administrative fee or the prices paid by the procuring agencies outside the jurisdiction of the State requesting the additional fee.

26 STANDARD OF PERFORMANCE AND ACCEPTANCE Purchaser has up to thirty (30) days after Product delivery (or as otherwise accepted by email or other writing earlier by Purchaser) to inspect the Product for external damage and for any concealed damage ("Acceptance Period"). If external or concealed damage is revealed during the Acceptance Period, then Purchaser shall notify Contractor. At Contractor's option, Contractor shall 1) repair such damage, 2) ship a replacement, or 3) refund the purchase price (upon return of the Product). After such Acceptance Period the Products shall be deemed accepted.

27. Reserved

28 TITLE OF PRODUCT Title and risk of loss shall pass to Purchaser upon delivery. Any transfers of Embedded Software shall be per Contractor's then-current Transfer and Re-Licensing Policy.

29. WAIVER OF BREACH Failure of Lead State or Participating Entity to declare a default or enforce any rights and remedies shall not operate as a waiver under this Master Agreement or Participating Addendum. Any waiver by the Lead State or Participating Entity must be in writing. Waiver by the Lead State or Participating Entity of any default, right or remedy under this Master Agreement or Participating Addendum, or breach of any terms or requirements shall not be construed or operate as a waiver of any subsequent default or breach of such term or requirement, or of any other term or requirement under this Master Agreement or Participating Addendum.

30. WARRANTY All products are sold with Contractor's standard limited warranty listed below:

30.1 Hardware. Contractor warrants that from the date of shipment by Contractor to Customer, and continuing for a period of one year, the Hardware will be free from material defects in material and workmanship and will substantially conform in all material respects to Ciena's applicable specifications, under normal use. This limited warranty extends only to the original user of the product. The terms of Contractor's RFP Response, Appendix C "Standard Hardware Warranty and Repair Service SOW" apply. Customer's sole and exclusive remedy and the entire liability of Contractor and its suppliers under this limited warranty will be, at Contractor's or its service center's option, shipment of a replacement within the period and according to the scope and replacement process described in such Appendix C "Standard Hardware Warranty and Repair Service SOW", or a refund of the purchase price, if the Hardware is returned to the party supplying it to Customer, if different than Contractor, freight and insurance prepaid. Contractor replacement parts, used in Hardware repair, may be new or equivalent to new. Contractor's obligations hereunder are conditioned upon the return of affected products, in accordance with Contractor's then-current Return Material Authorization (RMA) procedures.

30.2 Software. Contractor warrants that from the date of delivery by Contractor to Customer, and continuing for a period of the longer of (a) ninety (90) days for CESD Software, or (b) one year for Software other than CESD Software: (a) the media on which the Software is furnished will be free of defects in materials and workmanship, under normal use; and (b) the Software substantially conforms to its published specifications. The terms of Contractor's RFP Response, Appendix D "Standard Software Warranty SOW" apply. Except for the foregoing, the Software is provided AS IS.

This limited warranty extends only to the Customer who is the original licensee. Customer's sole and exclusive remedy and the entire liability of Contractor and its suppliers under this limited warranty will be, at Contractor or its service center's option, repair (which may be, without limitation, a suitable fix, patch or workaround for the problem, which may be included in a future release), replacement, or refund of the Software if reported (or, upon request, returned) as specified in such Appendix D "Standard Software Warranty SOW", to the party supplying the Software to Customer, if different than Contractor. In no event does Contractor warrant that the Software is error free or that Customer will be able to operate the Software without problems or interruptions. In addition, due to the continual development of new techniques for intruding upon and attacking networks, Contractor does not warrant that the Software or any equipment, system, or network on which the Software is used will be free of vulnerability to intrusion or attack, nor that the Software will operate in the third party hardware or software combinations that the Buyer may select.

30.3 Restrictions. This warranty does not apply if the product (a) has been altered, except by Contractor, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Contractor, (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident; or (d) is sold or, in the case of Software, licensed, for beta, evaluation, testing, or demonstration purposes for which Contractor does not receive a payment of purchase price or license fee; (e) any Software defect that cannot be reproduced; or (f) a version of Software not licensed or the Software version is outside of one major software release level of Contractor's then-current software version.

30.4 DISCLAIMER OF WARRANTY. EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, SATISFACTORY QUALITY, OR ARISING FROM A COURSE OF DEALING, LAW, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW. TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED, SUCH WARRANTY IS LIMITED IN DURATION TO THE WARRANTY PERIOD. This disclaimer shall apply even if the above-stated warranty fails of its essential purpose.

The above warranty does not apply to any beta software, any software made available for testing or demonstration purposes, any temporary software modules or any software for which Contractor does not receive a license fee. All such software is provided AS IS without any warranty whatsoever.

31. ASSIGNMENT OF ANTITRUST RIGHTS

Contract Vendor irrevocably assigns to a Participating Entity any claim for relief or cause of action which the Contract Vendor now has or which may accrue to the Contract Vendor in the future by reason of any violation of state or federal antitrust laws (15 U.S.C. § 1-15 or a Participating Entity's state antitrust provisions), as now in effect and as may be amended from time to time, in connection with any goods or services provided to the Contract Vendor for the purpose of carrying out the Contract Vendor's obligations under this Master Agreement or Participating Addendum, including, at a Participating Entity's option, the right to control any such litigation on such claim for relief or cause of action. Notwithstanding the foregoing, Contractor's obligation of assignment is only to the extent the assignment is necessary for the State to overcome its State's bar on indirect purchaser actions under federal anti-trust laws for claims of overcharges

32. WSCA-NASPO eMARKET CENTER Awarded responders are required to participate in the WSCA-

NASPO eMarket Center and, working through WSCA-NASPO's contractor (SciQuest), connect with the eMarket Center. The ideal situation would be to use either a hosted (by SciQuest) or Punchout Level 2 catalog configurations, but actual requirements will be determined by the Lead State Contract Administrator, WSCA-NASPO, WSCA-NASPO's contractor (SciQuest) and the awarded contractor, after award. Participation does not require an awarded responder to have any special level of technology or technological understanding.

33. AUTHORIZED RESELLERS. Fulfillment Partner (also referred to as "Reseller" or "Authorized Reseller") - means a third-party contractor qualified and authorized by Contractor solely as designated on eMarket, its NASPO Portal, or in writing by its Usage Report Administrator; and may be approved by the Participating State under a Participating Addendum, who may, to the extent authorized by Contractor, fulfill any of the requirements of this Master Agreement including but not limited to providing Products and Services under this Master Agreement and billing Purchasers directly for such Products and Services. "Contractor" as used in this Agreement refers to such respective Authorized Reseller that a Participating Entity has issued orders to and Authorized Reseller has accepted, hereunder, solely for such orders. Contractor may, upon written notice to the Participating State or as designated on eMarket and/or its NASPO Portal, add or delete authorized Fulfillment Partners as necessary at any time during the contract term. Fulfillment Partner has no authority to amend this Master Agreement, make any warranties or representations on behalf of Contractor, nor to bind Contractor to any additional terms and conditions, and any such amendments, warranties, representations, and obligations shall be void if made.

34. Definitions

Authorized Reseller – is defined in Section 33 above.

Participating State - see "Participating Entity."

Purchaser - (also referred to as "Buyer" or "Customer") means: (a) the Lead State, (b) any office, department, commission, council, board, committee, institution, legislative body, agency, public authority, public benefit corporation, other government corporation, or public educational institution of a Participating State or a Local Public Body within such Participating State, provided that such entity is authorized, under applicable laws, rules and/or regulations of the Participating State, (i) to purchase Product(s) and Services pursuant to this Master Agreement solely by execution of the applicable Participating Addendum, and (ii) to legally bind such body to the terms of such agreement solely by the issuance of a Purchase Order, Order, or Order Document in accordance with and pursuant to this Master Agreement, and (iii) has been authorized by the WSCA Contract Manager and Contractor to participate under this Master Agreement; and who (c) issues an Order to Contractor pursuant to this Master Agreement.

Contractor - means the person or entity delivering Products or performing services under the terms and conditions set forth in this Master Agreement.

Documentation - means user manuals, training materials, product descriptions and specifications, technical manuals, license agreements, supporting materials, and other information provided to Buyer relating to Products or Services offered by Contractor, whether distributed in print, electronic, CD-ROM, or video format. Documentation does not include marketing materials.

Intellectual Property – means any and all patents, copyrights, service marks, trademarks, trade secrets, trade names, patentable inventions, in tangible or intangible form, and all rights, title, and interest therein.

Lead State - means the State conducting this cooperative solicitation and centrally administering this Master Agreement with the permission of the Signatory States.

Master Agreement or Contract – means the underlying agreement executed by and between the Lead State, as WSCA-NASPO contract administrator, acting on behalf of WSCA-NASPO, and the Contractor, as now or hereafter amended. Notwithstanding Section 1 above, a PA is not part of this Master Agreement.

Order or Purchase Order - means any purchase order, sales order, or other document used by a Participating Entity to order the Products.

Participating Addendum - means a bilateral agreement executed by a Contractor and a Participating Entity incorporating this Master Agreement and any other additional Participating Entity specific language or other requirements ,e.g. ordering procedures specific to the Participating Entity, other terms and conditions.

Participating Entity - means a state, or other legal entity, properly authorized by a state to enter into the Master Agreement or Participating Addendum or who is authorized to order under the Master Agreement or Participating Addendum. "Buyer" means Participating Entity that issues an order for Product or Services.

Product - Any equipment, software (including embedded software), Documentation, or deliverable supplied or created by the Contractor pursuant to this Master Agreement.

Services - "Services" means those services within the scope of this Master Agreement, to include the attached Master Services Agreement, and listed on Contractor's then-current Price List, including training, installation and maintenance services, and/or other services related to the Products being acquired and further described in Contractor's quotes and Statements of Work and which are subject to the terms of service set forth in the SOW Terms and Conditions.

WSCA-NASPO -is a cooperative group contracting consortium for state procurement officials, representing departments, institutions, agencies, and political subdivisions (i.e., colleges, school districts, counties, cities, etc.) for all states and the District of Columbia. WSCA-NASPO is a cooperative purchasing arm of the National Association of State Procurement Officials (NASPO).

"WSCA Contract Manager" or "Contract Manager" shall mean the individual state member designated as the contract manager by WSCA, currently the State of Utah, as responsible for the legal maintenance and administration of the WSCA Master Agreement, notices, reports, and any other pertinent documentation or information

Additional Definitions and Alternative Terms for Consideration

Below are additional definitions and alternative terms for consideration by the sourcing teams depending upon the nature of the solicitation and negotiations between the Contractor and Vendor.

Embedded Software - means one or more software applications which permanently reside on a computing device.

Machine Code – means microcode, basic input/output system code, utility programs, device drivers, diagnostics, and another code delivered with a computing device for the purpose of enabling the function of the computing device, as stated in its published specifications.

Services – means installation, training, maintenance, consulting, professional support and other services provided by Contractor hereunder. **Software** – means software, in object code form, which is owned

or licensed by Contractor and may be licensed hereunder, including software embedded in Equipment and software provided for network management, design planning or otherwise licensed on a stand-alone basis.

Equipment – means the networking equipment and related electronic, electrical, optical and mechanical equipment provided by Contractor hereunder.

(revised March 2013)

37 NOTICES Notwithstanding anything contained in the Agreement to the contrary, all notices required or permitted under this Agreement will be in writing and will be deemed given: (a) when delivered personally; (b) when sent by confirmed facsimile or electronic mail, (provided that the original document is placed in air mail/air courier or delivered personally, within seven (7) days of the facsimile electronic notice); (c) three (3) days after having been sent by registered or certified mail, return receipt requested, postage prepaid (or six [6] days for international mail); or (d) one (1) day after deposit with a commercial express courier specifying next day delivery (or two (2) days for international courier packages specifying 2-day delivery), with written verification of receipt. All communications will be sent to the addresses set forth on the cover sheet of this Agreement or such other address as may be designated by a party by giving written notice to the other party pursuant to this paragraph. Notwithstanding the above, notices regarding general changes in pricing, policies, or programs may also be by posting on Ciena.com or by email or fax.

38 ENTIRE AGREEMENT; COUNTERPARTS.

Entire Agreement. This Master Services Agreement, in addition to the Attachments listed on the cover page, is the complete agreement between the parties concerning the subject matter of this Master Agreement and such Attachments and replaces any prior oral or written communications between the parties, except as agreed between the parties. There are no conditions, understandings, agreements, representations, or warranties expressed or implied, that are not specified herein. This Agreement may only be modified by a written document executed by the parties hereto.

Counterparts. This Master Agreement may be executed in two counterparts, each of which shall be deemed an original and together which shall constitute one and the same instrument. A validly executed counterpart that is delivered by one party to the other via electronic transmission (a "Counterpart Image") shall be valid and binding to the same extent as one delivered physically, provided that the valid signature is clearly visible in the Counterpart Image. In the event that a party delivers a Counterpart Image in place of an originally-executed counterpart, such party shall retain the originally-executed counterpart in its files for at least the duration of the Term hereof.

Exhibit 1 – Reserved
Exhibit 2
Additional Vendor Terms and Conditions Master Services Annex

- (a) This Master Services Annex forms a part of the Master Agreement between Contractor and Buyer (collectively, for the purposes of Services, the “Agreement”) and governs all Orders for Services placed under the WSCA NASPO Master Agreement Terms and Conditions (“WSCA Master Agreement”).
- (b) This Master Services Annex consists of (i) the Master Services Annex Terms and Conditions (including the Exhibits), (ii) incorporated Sections from the WSCA NASPO Terms and Conditions and (iii) the Ciena Statement of Work available upon request that the WSCA Customer may elect to purchase, which are incorporated in this Agreement by this reference.

Master Services Annex - Terms and Conditions

- 1. Definitions** are those set out in the Exhibit A, Glossary of Terms at the end of this Exhibit 1.
- 2. Scope.** This Annex describes the terms and conditions for Purchases by Customer of Services. Customer will be entitled to receive Services for which (i) the applicable Services fees have been paid, (ii) a valid Software license has been granted, and (iii) Customer provides information requested by Ciena such as valid serial numbers, site location, contract number, and Product type.
- 3. Orders.** Terms of this Section are covered in the WSCA NASPO Terms and Conditions.
- 4. Pricing.** For Direct Purchases, and subsequent Equipment List renewals, prices for Services shall be (a) those specified in Ciena's then-current Price List less any applicable contract discount in effect under the WSCA Master Agreement at the time of acceptance of the Purchase Order by Ciena, or (b) those set forth in a written price quotation submitted by Ciena or its Fulfillment Partner, if at or below the stated contract discount. All stated prices are exclusive of taxes, fees, and duties or other amounts in accordance with the WSCA Master Agreement. Any taxes related to Services purchased pursuant to this Annex shall be paid by Customer or Customer shall present an exemption certificate acceptable to the taxing authorities. Applicable taxes shall be billed as a separate item on the invoice, to the extent possible. In the event that Customer is unable to provide valid and applicable serial number(s) for Product and Ciena agrees to provide Services, then Service fees payable by Customer shall be at Ciena's then-current time and materials or non-contract service rates. Subject to the price discount floor established by Ciena under the WSCA Master Agreement, for Indirect Purchases, Fulfillment Partners are free to determine their resale prices unilaterally. Customer understands that no employee or representative of Ciena or anyone else has any authority to determine such resale prices, or to limit the Fulfillment Partners' pricing discretion with respect to Services.
- 5. Payment.** Terms of this Section are covered in the WSCA NASPO Terms and Conditions.
- 6. Invoicing.** Fees for Services, other than those for which a SOW is required, shall be invoiced a) for Maintain Service and Managed Services, in advance of delivery of Services, b) for other Services that continue beyond 30 days, at the end of each month for Services performed during that month, or upon completion, and c) for all other Services upon completion of the Service or any discrete element

thereof. The timing of invoices for Services provided pursuant to a SOW shall be set forth in the respective SOW.

7. Term and Termination.

a Ciena shall not be obligated to provide Services until after acceptance of a purchase order (or, for Maintenance Services and Training Services, until 60 days after acceptance of a purchase order). Maintenance Services are provided only for the original destination of Hardware ordered from Ciena. If the Hardware location changes, Ciena reserves the right to either terminate the Maintenance Service or modify the Maintenance Service pricing. Ciena reserves the right to terminate Services ordered by Buyer upon 90 days written notice.

(b)-(c) reserved

(d) If Services fees are not paid when due and payment has not been received within thirty (30) days after notice from Ciena of such past due payment, Ciena may withhold the provision of Services until all amounts past due are paid in full, and/or terminate immediately this Agreement, any Equipment List, and SOW.

(e) Ciena reserves the right to make changes to the scope and content of the Services or part thereof, including terminating the availability of a given Service, at any time upon ninety (90) days' prior notice. Such changes will become effective upon renewal of the affected Equipment Lists and SOWs. If Customer does not agree to a change of scope or content, Customer may terminate any affected Equipment List or SOW by notifying Ciena at least sixty (60) days prior to the expiration of the then current one (1) year term of the Equipment List or SOW. In such case, Ciena shall continue to provide Services until the next expiration date of the affected Equipment List or SOW.

(f) Each Equipment List and SOW hereunder shall terminate immediately upon termination of the Agreement.

(g) Upon termination of the Agreement, Participation Agreement, any Purchase Order, Equipment List, or SOWs to the extent permitted hereunder, Customer shall pay, subject to the payment terms described in this Agreement, Ciena for all work performed and Product delivered under the affected Purchase Order, Equipment Lists or SOWs up to the effective date of termination at the agreed-upon prices, fees, and expense reimbursement rates, so long as the work performed and Product delivered meets the applicable Ciena specifications provided in the Agreement, Participation Agreement, any Purchase Order, Equipment List, or SOWs.

(h) Firm orders for services under this Master Services Agreement placed and accepted prior to expiration of the contract term, (even if involving a multi-year commitment) remain valid in accordance with the contract terms which shall remain binding as to such prior orders only for the term stated therein, and shall not otherwise constitute an extension of the Master Services Agreement.

Additional terms governing Term and Termination are covered in the WSCA NASPO Terms and Conditions.

8 Confidentiality. Terms of this Section are covered in the WSCA NASPO Terms and Conditions.

9 Warranty. All services provided hereunder shall be performed in a workmanlike manner in accordance with industry standards expected of a company providing professional services in the optical industry. Except as specified in this section, Ciena hereby disclaims and customer waives all representations, conditions, and warranties (whether express, implied, or statutory), including without limitation, any warranty or condition (a) of merchantability, fitness for a particular purpose, non-infringement, title, satisfactory quality, accuracy, (b) arising from any course of dealing, course of performance, or usage in the industry. To the extent an implied

warranty cannot be disclaimed, such warranty is limited in duration to the applicable express warranty period. Customer's sole and exclusive remedy for breach of warranty shall be, at Ciena's option, re-performance of the services; or termination of this Annex or the applicable equipment list or SOW and return of the portion of the service fees paid to Ciena by customer for such non-conforming services.

10 Limitation of Liability and Consequential Damages Waiver. Terms of this Section are covered in the WSCA NASPO Terms and Conditions.

11 License. Terms of this Section are covered in the WSCA NASPO Terms and Conditions.

12. Ownership. Ciena shall at all times retain all right, title, and interest in and to all pre-existing Intellectual Property owned by Ciena as of the Effective Date and all Intellectual Property in and to the Services, Ciena Products, Deliverables, and Data Collection Tools or other Intellectual Property provided or developed by Ciena or a third party on Ciena's behalf thereafter. Customer shall at all times retain all right, title, and interest in and to all pre-existing Intellectual Property owned by Customer as of the Effective Date and all Intellectual Property that is developed by Customer or by a third party on Customer's behalf thereafter without the benefit of any of Ciena's Intellectual Property. Third Party Products shall at all times be owned by the applicable third party.

13 Force Majeure. Terms of this Section are covered in the WSCA NASPO Terms and Conditions.

14 Applicable law and Jurisdiction. Terms of this Section are covered in the WSCA NASPO Terms and Conditions.

15 Export Control. Customer shall comply with such laws and regulations governing use, export, re-export, and transfer of Ciena Products and technology and will obtain all required U.S. and local authorizations, permits, or licenses.

16 Assignment. Terms of this Section are covered in the WSCA NASPO Terms and Conditions.

17 Subcontracting. Ciena reserves the right to subcontract Services to a third party organization including Fulfillment Partners or Servicing Subcontractors (as defined in the WSCA Master Agreement) to provide Services to Customer; provided that invoicing and/or payments will only be handled by and through Ciena and/or its authorized Fulfillment Partners. Any such subcontract shall not relieve Ciena of any of its obligations under this Agreement.

If Contractor or its Fulfillment Partners are using servicing subcontractors for the performance of local marketing, maintenance, and/or technical support services in accordance with the terms and conditions of this Contract, servicing subcontractors may not directly accept purchase orders or payments for products or services from Purchasers under the terms and conditions of the contract.

Only Contractor or Fulfillment Partners authorized by Ciena may directly accept purchase orders, invoice, or receive payments for products or services under the terms and conditions of the contract.

The authorized Purchaser has the option of choosing whether to purchase the associated OEM maintenance and/or training to support the equipment purchased.

18 Inventory Review. From time-to-time Ciena may perform an inventory review of Customer's installed base and review serial numbers and other records (upon reasonable advance notice) to validate entitlement. Ciena will charge a Service fee if it finds that unauthorized Services are being provided. This Service fee includes amounts which should have been paid, interest, and attorneys' and audit fees. Attorneys' and audit fees will only be payable by the customer where the discrepancy exceeds 5 percent of the amount otherwise due and payable. Ciena requires that Customer take all necessary action (for example, disabling passwords) to ensure that any former employees and contractors do not access or use the Service.

19 Notices. Notwithstanding anything contained in the Agreement to the contrary, all notices required or permitted under this Agreement will be in writing and will be deemed given: (a) when delivered

personally; (b) when sent by confirmed facsimile or electronic mail, (provided that the original document is placed in air mail/air courier or delivered personally, within seven (7) days of the facsimile electronic notice); (c) three (3) days after having been sent by registered or certified mail, return receipt requested, postage prepaid (or six [6] days for international mail); or (d) one (1) day after deposit with a commercial express courier specifying next day delivery (or two (2) days for international courier packages specifying 2-day delivery), with written verification of receipt. All communications will be sent to the addresses set forth on the cover sheet of this Agreement or such other address as may be designated by a party by giving written notice to the other party pursuant to this paragraph. Notwithstanding the above, notices regarding general changes in pricing, policies, or programs may also be by posting on Ciena.com or by email or fax.

- 20. Entire Agreement.** This Master Services Annex, in addition to the general provisions of the WSCA Master Agreement pertinent to Services, is the complete agreement between the parties concerning the subject matter of this Master Agreement and Annex and replaces any prior oral or written communications between the parties, except as agreed between the parties. There are no conditions, understandings, agreements, representations, or warranties expressed or implied, that are not specified herein. This Agreement may only be modified by a written document executed by the parties hereto.
- 21. No Waiver.** The waiver by either party of any right provided under this Agreement shall not constitute a subsequent or continuing waiver of such right or of any other right under this Agreement.
- 22. Severability.** In the event that one or more terms of this Agreement becomes or is declared to be illegal or otherwise unenforceable by any court of competent jurisdiction, each such term shall be null and void and shall be deemed deleted from this Agreement. All remaining terms of this Agreement shall remain in full force and effect. Notwithstanding the foregoing, if this paragraph is invoked and, as a result, the value of this Agreement is materially impaired for either party, as determined by such party in its sole discretion, then the affected party may terminate this Agreement by written notice with immediate effect to the other.
- 23. Attorneys' Fees.** In any suit or proceeding relating to this Agreement, the prevailing party will have the right to recover from the other its costs and reasonable fees and expenses of attorneys, accountants, incurred in connection with the suit or proceeding, including costs, fees, and expenses upon appeal, separately from and in addition to any other amount included in such judgment. This provision is intended to be severable from the other provisions of this Agreement, and shall survive expiration or termination and shall not be merged into any such judgment unless the judgment expressly precludes survivability.
- 24. No Agency.** This Agreement does not create any agency, partnership, joint venture, or franchise relationship. No employee of either party shall be or become, or shall be deemed to be or become, an employee of the other party by virtue of the existence or implementation of this Agreement. Each party hereto is an independent contractor. Neither party shall assume or create any obligation of any nature whatsoever on behalf of the other party or bind the other party in any respect whatsoever.
- 25. Counterparts.** This Agreement may be executed in two counterparts, each of which shall be deemed an original and together which shall constitute one and the same instrument. A validly executed counterpart that is delivered by one party to the other via electronic transmission (a "Counterpart Image") shall be valid and binding to the same extent as one delivered physically, provided that the valid signature is clearly visible in the Counterpart Image. In the event that a party delivers a Counterpart Image in place of an originally-

executed counterpart, such party shall retain the originally-executed counterpart in its files for at least the duration of the Term hereof.

26. **Headings.** Headings of sections have been added solely for convenience of reference and shall not be deemed part of this Agreement.
27. **Survival.** Sections 5 (Payment), 7 (Term and Termination), 8 (Confidentiality), 9 (Warranty), 10 (Limitation of Liability and Consequential Damages Waiver), 11 (License), 12 (Ownership), 13 (Force Majeure), 14 (Applicable Law and Jurisdiction), 15 (Export Control), Section 18 (Inventory Review), 19 (Notices), 20 (Entire Agreement), 21 (No Waiver), 22 (Severability), 23 (Attorneys' Fees), 24 (No Agency), 27 (Survival), and the Glossary of Terms shall survive the termination or expiration of this Agreement.

Exhibit A Glossary of Terms

In addition to the Definitions set forth in the WSCA Master Agreement, the following definitions shall apply to this Services Annex:

Business Days means the generally accepted days of operation per week within the relevant region where the Services shall be performed, excluding local holidays as observed by Ciena.

Ciena.com (<http://www.ciena.com/support/?navi=top> or other site as designated by Ciena) is the Ciena website for its suite of services and information.

Data Collection Tools means Hardware or Software tools that support Ciena's ability to provide troubleshooting on critical cases, data analysis, and report-generation capabilities.

Depot Time or Local Time means Central European Time for Services provided in Europe-Middle-East and Africa, Australia's Eastern Standard Time for Services provided in Australia, Japan's Standard Time for Services provided in Japan, and Pacific Standard Time for Services provided in all other locations.

Deliverable means, with respect to each SOW, the items specified as deliverables in the SOW.

Direct Purchases means purchases of Services by Customer directly from Ciena.

Equipment List means the list of Hardware and/or Software for which Ciena provides services.

Upgrade means a separately licensed and priced Software release that contains an enhanced configuration or feature set.

Hardware means tangible Ciena equipment, devices, or components made available to Customers.

Indirect Purchases means purchases of Services by Customer through a Fulfilment Partner.

Local Time means local time on Business Days.

Maintenance Release means an incremental Software release that provides maintenance fixes and may provide additional Software functions. Ciena designates Maintenance Releases as a change in the digits to the right of the tenths digit or of the hundredths digit of the Software version number [x.x.(x) or x.x.x.(x)].

Major Release means a release of Software that provides additional software functions. Ciena designates Major Releases as a change in the ones digit of the Software version number [(x).x.x].

Minor Release means an incremental release of Software that provides maintenance fixes and additional Software functions. Ciena designates Minor releases as a change in the tenths digit of the Software version number [x.(x).x].

Price List means the price list for services applicable in the country where the Services are ordered or delivered.

Product means both Ciena Hardware and/or Software which are generally available.

RMA means Return Material Authorization.

Services means one or more of the services options (Implementation Services, Maintain Services, Training Services, and/or Consulting and Design Services) quoted by Ciena and selected by the Customer in its Purchase Order and described in Contractor's Statement of Work.

Software means the software programs licensed to Customer by Ciena along with copies, Updates, or Upgrades to those software programs.

Standard Business Hours means (i) 8:00 AM to 5:00 PM, Depot time, on Business Days for replacement of failed Products and (ii) 8:00 AM to 5:00 PM, Local Time at location of the respective Ciena TAC, on Business Days for case handling of TAC calls.

Statement of Work (SOW) means the documents agreed upon by the parties that define Services and deliverables to be provided.

TAC means the Ciena Technical Assistance Center.

Update means Ciena Software Maintenance Releases, Minor Releases, and Major Releases containing the same configuration or feature set as originally acquired, unless the Customer has upgraded the applicable Hardware or Software to a configuration or feature set other than what was originally acquired, and the applicable license fee for that upgrade has been paid. Updates do not include Upgrades.

WSCA shall mean the WSCA NASPO Contracting Alliance (WSCA). WSCA is a cooperative group contracting consortium for state government departments, institutions, agencies, and political subdivisions (i.e., colleges, school districts, counties, cities, etc.). Rights and obligations under this contract are limited to those Participating States who execute a Participating Addendum with Ciena.

ATTACHMENT B – Scope of Work

The following categories are authorized under this contract:

5.2.4 OPTICAL NETWORKING — High capacity networks based on optical technology and components that provide routing, grooming, and restoration at the wavelength level as well as wavelength based services.

5.2.4.1 Core DWDM (Dense Wavelength Division Multiplexing) Switches —

Switches used in systems designed for long haul and ultra long-haul optical networking applications.

5.2.4.2 Edge Optical Switches — Provide entry points into the enterprise or service provider core networks.

5.2.4.3 Optical Network Management — Provides capabilities to manage the optical network and allows operators to execute end-to-end circuit creation.

5.2.4.4 IP over DWDM (IPoDWDM) — A device utilized to integrate IP Routers and Switches in the OTN (Optical Transport Network).

5.2.8 SWITCHES — Layer 2/3 devices that are used to connect segments of a LAN (local area network) or multiple LANs and to filter and forward packets among them.

5.2.8.1 Campus LAN – Access Switches — Provides initial connectivity for devices to the network and controls user and workgroup access to internetwork resources. The following are some of the features a campus LAN access switch should support:

Security

- i. SSHv2 (Secure Shell Version 2)
- ii. 802.1X (Port Based Network Access Control)
- iii. Port Security
- iv. DHCP (Dynamic Host Configuration Protocol) Snooping

VLANs

Fast Ethernet/Gigabit Ethernet

PoE (Power over Ethernet)

link aggregation

10 Gb support

Port mirroring

Span Taps

Support of IPv6 and IPv4

Standards-based rapid spanning tree

Netflow Support (Optional).

5.2.8.2 Campus LAN – Core Switches — Campus core switches are generally used for the campus backbone and are responsible for transporting large amounts of traffic both reliably and quickly. Core switches should provide:

- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- Security
 - SSHv2
 - MacSec encryption
 - Role-Based Access Control Lists (ACL)
- Support of IPv6 and IPv4
- 1/10/40/100 Gbps support
- IGP (Interior Gateway Protocol) routing
- EGP (Exterior Gateway Protocol) routing
- VPLS (Virtual Private LAN Service) Support
- VRRP (Virtual Router Redundancy Protocol) Support
- Netflow Support.

5.2.8.3 Campus Distribution Switches — Collect the data from all the access layer switches and forward it to the core layer switches. Traffic that is generated at Layer 2 on a switched network needs to be managed, or segmented into Virtual Local Area Networks (VLANs), Distribution layer switches provides the inter-VLAN routing functions so that one VLAN can communicate with another on the network. Distribution layer switches provides advanced security policies that can be applied to network traffic using Access Control Lists (ACLs).

- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- Security (SSHv2 and/or 802.1X)
- Support of IPv6 and IPv4
- Jumbo Frames Support
- Dynamic Trunking Protocol (DTP)
- Per-VLAN Rapid Spanning Tree (PVRST+)
- Switch-port auto recovery
- NetFlow Support or equivalent

5.2.8.4 Data Center Switches — Data center switches, or Layer 2/3 switches, switch all packets in the data center by switching or routing good ones to their final destinations, and discard unwanted traffic using Access Control Lists (ACLs), all at Gigabit and 10 Gigabit speeds. High availability and modularity differentiates a typical Layer 2/3 switch from a data center switch. Capabilities should include:

- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- Ultra-low latency through wire-speed ports with nanosecond port-to-port latency and hardware-based Inter-Switch Link (ISL) trunking
- Load Balancing across Trunk group able to use packet based load balancing scheme

Bridging of Fibre Channel SANs and Ethernet fabrics

Jumbo Frame Support

Plug and Play Fabric formation that allows a new switch that joins the fabric to automatically become a member

Ability to remotely disable and enable individual ports

Support NetFlow or equivalent

5.2.8.5 Software Defined Networks (SDN) - Virtualized Switches and Routers —

Technology utilized to support software manipulation of hardware for specific use cases.

5.2.8.6 Software Defined Networks (SDN) — Controllers - is an application in software-

defined networking (SDN) that manages flow control to enable intelligent networking. SDN controllers are based on protocols, such as OpenFlow, that allow servers to tell switches where to send packets. The SDN controller lies between network devices at one end and applications at the other end. Any communications between applications and devices have to go through the controller. The controller uses multiple routing protocols including OpenFlow to configure network devices and choose the optimal network path for application traffic.

5.2.8.7 Carrier Aggregation Switches — Carrier aggregation switches route traffic in addition to bridging (transmitted) Layer 2/Ethernet traffic. Carrier aggregation switches' major characteristics are:

Designed for Metro Ethernet networks

Designed for video and other high bandwidth applications

Supports a variety of interface types, especially those commonly used by Service Providers

Capabilities should include:

Redundant Processors

Redundant Power

IPv4 and IPv6 unicast and multicast

High bandwidth

Low latency

Hot swappable power supplies and fans

MPLS (Multiprotocol Label Switching)

BGP (Border Gateway Protocol)

Software router virtualization and/or multiple routing tables

Policy based routing

- Layer 2 functionality

- Per VLAN Spanning Tree

- Rapid Spanning Tree

- VLAN IDs up to 4096

- Layer 2 Class of Service (IEEE 802.1p)

- Link Aggregation Control Protocol (LACP)

QinQ (IEEE 802.1ad)

5.2.8.8 Carrier Ethernet Access Switches — A carrier Ethernet access switch can connect directly to the customer or be utilized as a network interface on the service side to provide layer 2 services.

- Hot-swappable and field-replaceable integrated power supply and fan tray
- AC or DC power supply with DC input ranging from 18V to 32 VDC and 36V to 72 VDC
- Ethernet and console port for manageability
- SD flash card slot for additional external storage
- Stratum 3 network clock
- Line-rate performance with a minimum of 62-million packets per second (MPPS) forwarding rate
- Support for dying gasp on loss of power
- Support for a variety of small form factor pluggable transceiver (SFP and SFP+) with support for Device Object Model (DOM)
- Timing services for a converged access network to support mobile solutions, including Radio Access Network (RAN) applications
- Support for Synchronous Ethernet (SyncE) services
- Supports Hierarchical Quality of Service (H-QoS) to provide granular traffic-shaping policies
- Supports Resilient Ethernet Protocol REP/G.8032 for rapid layer-two convergence

5.3.1 SERVICES — For each Category above (5.21-5.30), the following services should be available for procurement as well at the time of product purchase or anytime afterwards.

5.3.1.1 Maintenance Services — Capability to provide technical support, flexible hardware coverage, and smart, proactive device diagnostics for hardware.

5.3.1.2 Professional Services

Deployment Services

Survey/ Design Services — Includes, but not limited to, discovery, design, architecture review/validation, and readiness assessment.

Implementation Services — Includes, but not limited to, basic installation and configuration or end-to-end integration and deployment.

Optimization — Includes, but not limited to, assessing operational environment readiness, identify ways to increase efficiencies throughout the network, and optimize Customer's infrastructure, applications and service management.

Remote Management Services — Includes, but not limited to, continuous monitoring, incident management, problem management, change management, and utilization and performance reporting that may be on a subscription basis.

Consulting/Advisory Services — Includes, but not limited to, assessing the availability, reliability, security and performance of Customer's existing solutions.

Data Communications Architectural Design Services — Developing architectural strategies and roadmaps for transforming Customer's existing network architecture and operations management.

Statement of Work (SOW) Services — Customer-specific tasks to be accomplished and/or services to be delivered based on Customer's business and technical requirements.

5.3.1.3 Partner Services — Provided by Contractor's Authorized Partners/Resellers.

Subject to Contractor's approval and the certifications held by its Partners/Resellers, many Partners/Resellers can also offer and provide some or all of the Services as listed above at competitive pricing, along with local presence and support. As the prime, Contractor is still ultimately responsible for the performance of its Partners/Resellers. Customers can have the option to purchase the Services to be directly delivered by Contractor (OEM) or its certified Partners/Resellers.

5.3.1.4 Training — Learning offerings for IT professionals on networking technologies, including but not limited to designing, implementing, operating, configuring, and troubleshooting network systems pertaining to items provided under the master agreement.

Attachment B-1 (from 5.2.4 – Optical Networking Requirements)

5.2.4 OPTICAL NETWORKING — High capacity networks based on optical technology and components that provide routing, grooming, and restoration at the wavelength level as well as wavelength based services.

5.2.4.1 Core DWDM (Dense Wavelength Division Multiplexing) Switches —

Switches used in systems designed for long haul and ultra long-haul optical networking applications.

Ciena Response: 6500 Features & Benefits

The 6500 integrated platform provides a DWDM intelligent photonic layer in addition to service access and transport interfaces for protocols such as Ethernet, SONET, storage, 10G, 40G and 100G services. The 6500 will allow WSCA-NASPO to create a network that will support 100G transmission day one with a network that mitigates risk and operates over the fiber footprint with maximum operating and spectral efficiency.

Ciena’s solution not only meets all requirements, but also supports metro & long haul 100G connectivity today, with minimal risk, and at an affordable cost with a path to higher connectivity speeds in the future. Additionally the 6500 provides an optimal combination of intelligent photonics, services flexibility and high operational efficiency versus competitive solutions.

Strategic Benefits of the Ciena 6500 Solution include:

- Proven 100G Capability: With first in the world commercial deployment of spectrally-efficient 100G systems in a long haul network.
- Leading Photonic Capabilities: With coherent detection and electronic dispersion compensation allowing the platform to be deployed on virtually any fiber with no in-line dispersion compensating fiber, resulting in lower operating costs and few if any engineering challenges once the network is deployed.
- Scalability: Unmatched growth potential to 8.8 Tbps capacity with 100G line cards with ability to operate 40G, 100G and higher rates over any existing networks.

Ciena feels that the 6500 is designed to serve as the optical network platform for more than a decade, with scalability and design to support emerging connectivity requirements for the long term foreseeable future.



Key Technical Advantages:

- Supports WaveLogic3 coherent 40G and 100G interfaces to maximize return on investment by delivering up to 10 times more traffic capacity on the existing network.
- Electronically compensates for dispersion, eliminating the need for fixed compensators and associated amplifiers, while also simplifying engineering of the network.
- Delivers high density with efficient space and power requirements, enabling multiple 10G / 40G /100G services to be supported from a location, side by side.

Since delivering the 40Gbps optics in May 2008, Ciena has shipped over 1,500 40G Coherent Receivers and has secured the #1 position in 40G shipments globally with 41% market-share. The 100Gbps optics utilizes the same technology thus minimizing risk associated with the technology delivery of 100G. As bandwidth demands continue to increase, 40G or 100G connectivity can be added to established networks without re-engineering the network or any disruption to service. Ciena's 100G Adaptive Optical Engine solutions deliver 100G network capacity, enabling ten times the existing network throughput and enabling the network to keep pace with dramatically increasing bandwidth demand.

Ciena's 40G and 100G solutions are based on our WaveLogic 3 family of coherent optical processors which allow for multiple modulation techniques such as Dual Polarization Quadrature Phase Shift Keying DP-QPSK modulation, Dual Polarization Binary Phase Shift Keying (DP-BPSK modulation, Dual Polarization 16 Quadrature Amplitude Modulation (DP-16QAM) modulation, coherent detection and advanced electronic digital signal processing techniques—all of which has been first commercialized by Ciena.

Coherent technology allows 40Gbps and 100Gbps operation over 10G-engineered networks and advanced digital signal processing automatically corrects for signal degradations caused by fiber impairments.

- The 6500 family provides industry leading 40G and 100G coherent based solutions. Up to 88 channels of 100Gbps wavelengths, or 8.8Tbps, can be supported on a single fiber or a mix of 10G/40G/100G wavelengths. The 6500 solution provides the highest spectral efficiency supporting 40Gbps or 100Gbps on a single wavelength, compare to some other solutions that requires more than 1 wavelength for transporting 40Gbps or 100Gbps. The 6500 40G and 100G solutions have been proven to run over any types of fiber including fiber with very high PMD. Moreover, the 6500 solution can be deployed over foreign networks.
- Density and Efficiency: Ciena's 40G and 100G have longer distance support without regen than competitive solutions, which results in lower CAPEX/OPEX and power. Ciena's 100G and 40G densities are higher than competitive offerings as well. Additionally, network flexibility with higher degree ROADM support on 6500 with support of 2/4/8 degree switching and branching at the individual wavelength basis. Finally, the 6500 supports lower sparing expense with tunable optics on the 6500.

Ciena's 100G Differentiation

Ciena's 6500 supports 100G now, with a proven implementation that is widely recognized as leading the commercial development of 100G transmission. Additionally, the Ciena solution is designed to support transmission beyond 100G, an inevitable bandwidth threshold that we have now prototyped, and that will likely be commercially available in the 2015 time frame.

- Proven 100G technology: Ciena's 100G technology has been demonstrated in numerous public trials of challenging scope, many of which operated live network traffic alongside pre-existing 10G and 40G wavelengths as shown below.

- Proven Technology Foundation: Additionally Ciena's 40G and 100G solutions are serving 50+ customer globally today with 40G in commercial deployment since May 2008 and 100G since December 2009. Ciena was the first to market in delivering both 40G and 100G DP-QPSK coherent based transport solutions.
- OIF Standard Compliant: Ciena pioneered the DP-QPSK coherent based solution for high capacity transport and it has been standardized by OIF as the modulation scheme for 100G transport.
- Proven Interoperability: Ciena certified interoperability for 100G client support with Juniper Networks in May 2010, eliminating risk of interoperability hurdles.
- Seamless support of any mix of 10G/40G and 100G connectivity: Ciena's architecture enables 100G services to be implemented side by side with 10G and 40G and sub rate services with each service running independently with minimal impact to the other (regeneration locations, etc).
- Soft-Forward Error Correction (FEC): Moving to ultra-high-capacity links while retaining a commercially viable reach requires improved noise mitigation, which can be achieved using high-gain FEC. In contrast to hard-coded FEC, which uses ones and zeros to make its correction decision, soft FEC uses probabilities in conjunction with receiver intelligence. This results in significantly improved system performance that can support higher capacities (with suitable reach), tolerate higher span losses, or achieve significant reach improvements. WaveLogic 3 soft FEC can also be adjusted to minimize latency, in exchange for higher system gain, to provide optimal performance in latency-sensitive applications.
- WaveLogic 3 Digital Signal Processor chipsets: Leveraging Ciena's history of DSP and coherent deployment experience, the WaveLogic 3 coherent receiver DSP engine has six times more processing power than WaveLogic 2 and provides stronger PMD mitigation and improved system performance. Achieving 75 trillion operations per second, 32nm CMOS provides the highest level of functional integration with the lowest power consumption. Thus, for example, the soft FEC is integrated into the Rx ASIC.

Tx DSP delivers some very important flexibility and economic networking benefits. Spectral shaping can provide improved system margin, especially in the cascaded filter/OADM environments typically found in metro networks, as well as optimal spectral efficiency on a flexible grid. Spectral shaping is also critical for spectrally efficient Terabit transmission superchannels.

Programmable modulation, or constellations with both varying phase and amplitude, is required to practically achieve greater than 100 Gb/s transmission rates and allows the operator to make trade-offs between reach and capacity for a particular application. Tx DSP also provides additional distortion mitigation.

- 100G Integrated OTDR Test Set: By integrating a 100G OTDR test set into our 100G transponder circuit packs, Ciena has effectively reduced CapEx, eliminated the need to purchase expensive 100G test tests, turn up services more quickly and perform faster troubleshooting. Turning up 100G wavelengths has never been easier. This unique capability provides the ability to verify the integrity of a partial or

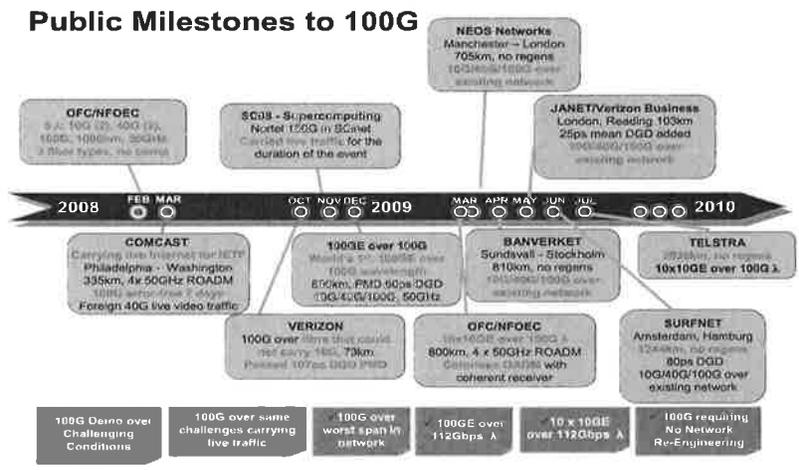
complete connectivity path with or without fiber loopbacks. The integrated OTDR test set is an optional feature on our transponders.

The Ciena 100G solution fully meets and exceeds commercial requirements for 100Gbps transmission where it is needed in the network:

- Supports 44 100GHz wavelengths of 100Gbps for a line capacity of 4.4Tbps
- Supports 88 50GHz wavelengths of 100Gbps for a line capacity of 8.8Tbps
- Can work over the same fiber alongside 10G and 40G wavelengths
- Supports reach of 2,800km
- Requires no dispersion or PMD compensators
- Operates with better tolerance to PMD than today's 10G systems with up to 50ps of mean DGD compensation
- Can pass through 14+ ROADM's with minimal reach penalty
- Continued investment: Ciena continues to invest into advancement of 100G technology and into transmission beyond 100G. We have active development of transmission technologies for the 6500 at 400G and beyond with prototypes now in place.

Demonstrated 100G Capability

The 6500 supports 100G now, with a proven implementation that is widely recognized as leading the commercial development of 100G transmission. Ciena's 100G technologies have been demonstrated in numerous public trials, in live, production networks alongside pre-existing 10G and 40G wavelengths (see figure below). In some cases the 100Gbps optics were transported over a pre-existing foreign line system, and a world-record distance (2000 km) for 100Gbps transport was achieved with Telstra in Australia.



Ciena 100G wavelength transmission technology was first deployed as a limited availability release in October 2009, it was made generally available in Release 7.0 (July, 2010) with 10x10G client multiplexing support.

Ciena's 100GbE Client interface technology, compliant with the IEEE 100 Gbps Standard, version P802.3ba, became available in 4Q10, supported in R 7.0. Ciena supports LR-4, LR-10, SR-10 CFP's.

Ciena has proven interoperability with a leading router vendor (Juniper Networks) with results that proved full interoperability. This testing was performed within Ciena laboratories, and Ciena houses resources and facilities to prove 802.3ba interoperability with other Optical and Layer 2/3 network platforms, and can perform that testing on request.

Ciena's Approach for 100G Transmission

Ciena's 100G solution is based upon industry proven modulation schemes and a flexible multi-degree ROADM photonic line system. Ciena's 100G Coherent optics are built on several years of development experience including: first to market eDCO (electronic Dynamically Compensating Optics), 40G/100G DP-QPSK modulation, and 40G/100G Coherent Receivers.

Ciena's 100Gbps solution operates over a 50GHz or 100GHz ITU wavelength grid and supports IEEE standard 10GbE clients while aligning with the 100GbE standards. Ciena's 100G DWDM optics have been available since 2009.

Flexible Photonic Line System – Ciena offers the 6500 Photonic Line, with full ROADM (Reconfigurable Optical Add/Drop Multiplexer) flexibility. The Wavelength Selective Switch enabled ROADM supports dynamic all-optical branching for up to eight different optical paths in addition to 100% flexible individual wavelength add/drop capabilities. The 6500 Photonic Line is designed to maximize the all-optical connectivity across the network (minimal Optical-Electrical-Optical conversion). Ciena also offers a non-shelf based Flexible Photonic line System called Common Photonic Line (CPL) with similar capabilities to the 6500 Photonic line providing service providers with a choice.

Combined with Ciena's 10G, 40G, or 100G eDCO interfaces, the photonic line requires absolutely no Dispersion Compensation or Polarization Mode Dispersion (PMD) modules, regardless of the fiber plant (mixed fiber types, older fiber, aerial deployments, etc.). Up to 88 x 100Gbps channels are supported with 50GHz channel spacing (8.8 Tbps of capacity per fiber). Ciena's 100G solution will accelerate service turn-up, and time to revenue, while allowing network operators to further leverage existing fiber plants.

Differentiator 1: Electronic Dynamically Compensating Optics (eDCO)

The Ciena 10G, 40G and 100G optical interfaces are based on Ciena eDCO technology – which allows each individual wavelength to be routed anywhere through the network independent of fiber type and impairments. eDCO's therefore offer better reach and eliminate the need for costly space-consuming compensator devices, and provides at least 15% lower end-to-end latency compared to other solutions.

Eliminating compensation devices also reduces route loss, simplifies and reduces amplifier needs, and hence costs, since the loss added by those devices is no longer added to the span. eDCO's allow the elimination of the static DCSM (Dispersion Compensating Slope Module) spools that prevent wavelength re-direction without extensive network re-engineering. Ciena's Tx/Rx circuit packs are fully automated

to adjust and lock onto optimal Chromatics Dispersion values across fiber type transitions and through cascaded OADM's.

eDCO technology is patented by Ciena. In addition, all 6500 DWDM optical interfaces support tunable lasers across the entire C-Band, including the 40G and 100G interfaces, resulting in a simplified and lower costing sparing strategy.

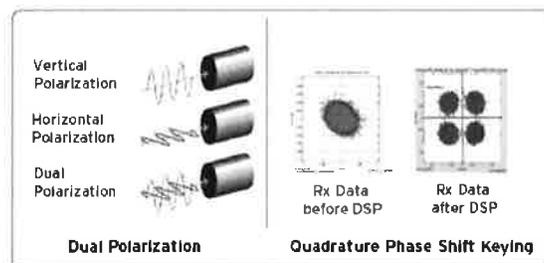
Ciena's eDCO technology meets and exceeds all the criteria of a volume deployable 100G solution and fully aligns with the vision of an adaptive all-optical intelligent network:

- Offers significantly superior CD tolerance to 10/40/100G networks, with integrated electronic dispersion compensation technology, eliminating the need for DSCM's
- Provides better PMD tolerance than 10G networks, eliminating the need for external PMD compensators
- Is scalable and can operate in 50-GHz-spaced systems
- Maintains complete agility required to meet ever-changing service requirements with flexible OADM/ROADM support
- Supports the coexistence of 10G, 40G and 100G wavelengths on the same photonic line system

Differentiator 2: Dual Polarization Quadrature Phase Shift Keying (DP-QPSK)

Shift Keying (DP-QPSK) - In February 2008, at the Optical Fiber Conference/National Fiber Optical Engineer (OFC/NFOEC) Conference, Ciena demonstrated 100Gbps transmission, whereby the 100G was adjacent to 10G and 40G channels in a 50GHz grid, over 1000km of uncompensated mixed fiber (three different fibers). One month later at the 71st IETF conference in Philadelphia, Comcast and Ciena conducted the first live 100G field trial, where 1,000 of the world's top engineers accessed the Internet over Ciena 100Gbps prototype equipment for close to a week. The 100G connection was established and operated with "commercial grade" quality of service, and without impacting the existing traffic on the Comcast network, underlining the robustness and value of the Ciena approach.

The technology that made this possible is DP-QPSK modulation with a coherent receiver. This modulation format lowers the baud rate seen by the photonic line, yet carries more information per bit by encoding data within the phase and polarization of the optical spectrum. In the case of 100Gbps, there are 2 bits per symbol, and 2 polarization states to maintain 50Gbps of data throughput using a minimal baud rate. Two of these 50Gbps DP-QPSK sub-carriers are frequency division multiplexed into a single composite 100Gbps signal that operates on a 50GHz grid.



The DP-QPSK modulation format allows for a lower effective baud rate on the line to reduce the optical fiber impairments impacts, while allowing extended reach for higher line rate signals such as 40G, 100G and beyond.

Differentiator 3: Coherent Transmission

Coherent Transmission is absolutely a key requirement to break the next bandwidth barrier, as we increase line rate from 10Gbps to 40Gbps to 100Gbps. A Coherent Receiver is analogous to tuning an FM radio to a station via the use of a local oscillator to match the carrier frequency. Much more information may be transmitted by leveraging phase and polarization information. If the local oscillator is tuned into the frequency of the incoming signal, then only the information from the incoming signal is extracted, and neighboring channel information is ignored.

Ciena applied this method, which is common to most modern radio receivers, towards solving optical transmission challenges at higher line rates in a very innovative implementation. The coherent receiver is able to lock into the frequency and phase of the incoming signal and is thus able to recover the incoming DP-QPSK bits appropriately.

- With Coherent Transmission, the receiver down-converts the whole optical signal linearly to an electrical signal by means of heterodyne or homodyne detection. A local oscillator is used (the Tx laser on the same circuit pack in Ciena's case) to mix with the incoming signal and detect phase information. This increases the number of bits per symbol and as a result creates a new leverage point for spectral efficiency (bits per Hertz per second).
- In addition, we can realize post-processing functions such as compensation for Chromatic Dispersion (CD) and Polarization Mode Dispersion (PMD) in the digital domain, all within the same Tx/Rx circuit pack in Ciena's case. This results in better overall optical performance and lower latency.

An additional benefit of Ciena's Coherent Receiver is that a traditional Mux/Demux filter is not required to isolate the received channel prior to signal termination. The Receiver may simply "tune" to the frequency of the carrier signal to detect the specific incoming wavelength. This has profound implications on expanding the overall network flexibility.

6500 Development Directions

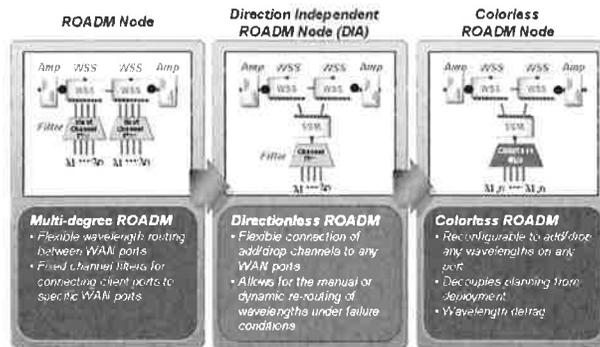
Ciena has committed to maintain a central focus on R&D to continue to advance the 6500 product family in order to maintain leadership in transmission scalability and network automation and improved total cost of ownership.

Colorless ROADM Approach

There are several ways of implementing a colorless ROADM; typically involving tunable filters. Ciena's approach to implementing a colorless ROADM is one that does not add the cost and complexity of tunable filters rather leverages the inherent benefits of the coherent receivers that are at the heart of our transmission systems. By tuning the local oscillator that is used in the coherent detection process,

we actually make a tunable receiver that can tune to any frequency in the spectrum and thus enable colorless ROADM designs without extra tunable filter elements. This approach is simple, low cost, and provides the flexibility needed for next generation network architectures.

Evolution of ROADM-based DWDM Networks

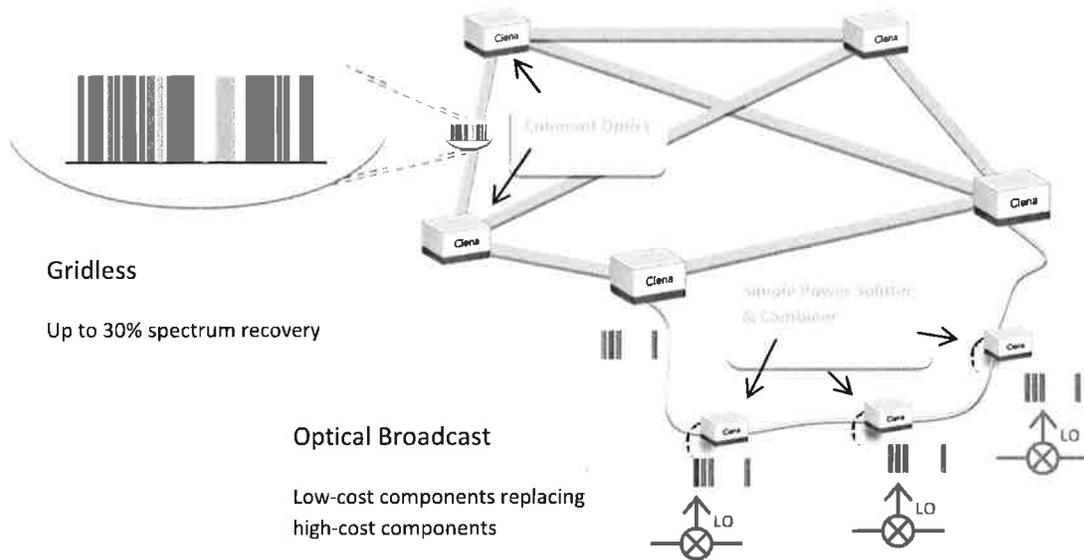


Dynamic wave restoration

The advent of practical colorless and directionless ROADM technologies has allowed Ciena for the first time to contemplate a usable control plane for the optical layer. Using similar techniques to those we have pioneered in L1 control planes, our L0 control plane will allow networks to be dynamically reconfigured at the optical level. While optical reconfiguration is not yet fast enough to be used for protection switching, it is an excellent way to adapt an optical network to changing demands or to re-establish protection paths after a network failure in a particular area.

New Architectures

For higher capacities and simpler network elements

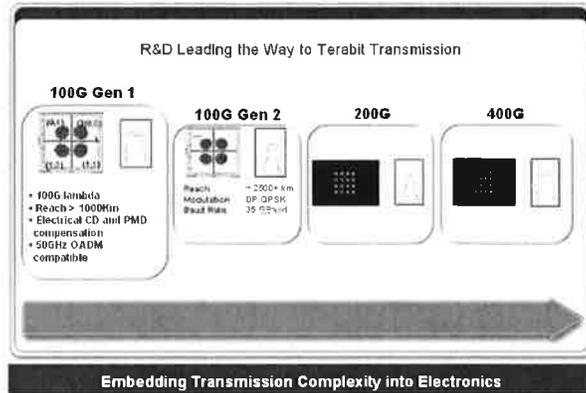


Key Benefits:

- Network simplification and full flexibility with colorless networking leveraging Ciena's unsurpassed experience in coherent technology.
- Reduced turn-up time and faster delivery of new photonic-based services with the capability of decoupling deployment from planning
- Increased network reliability and fault recovery through the redirection of channels in the photonic layer using colorless, directionless, photonic restoration
- Optimized wavelength usage over the life of a network with wavelength de-fragmentation capabilities
- Simpler operations and network troubleshooting with state-of-the-art photonic management tools

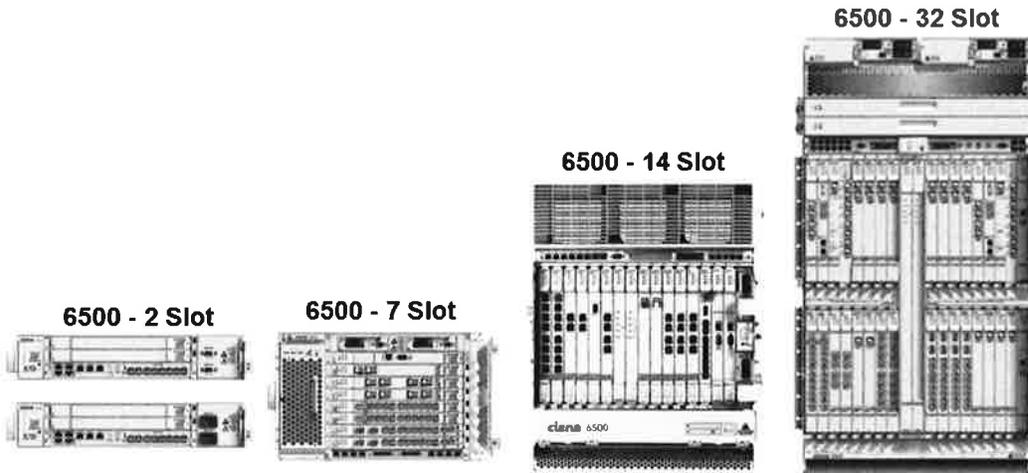
Transmission beyond 100G

Ciena continues to drive development on ultra-high bandwidth transmission. Ciena is already prototyping transmission beyond 100G, an inevitable bandwidth threshold that will be available this decade. This technology will be deployable on the 6500 with design that incorporates the best practices of our 100G solution discussed with this response, as well as others unique to the high capacity rates.



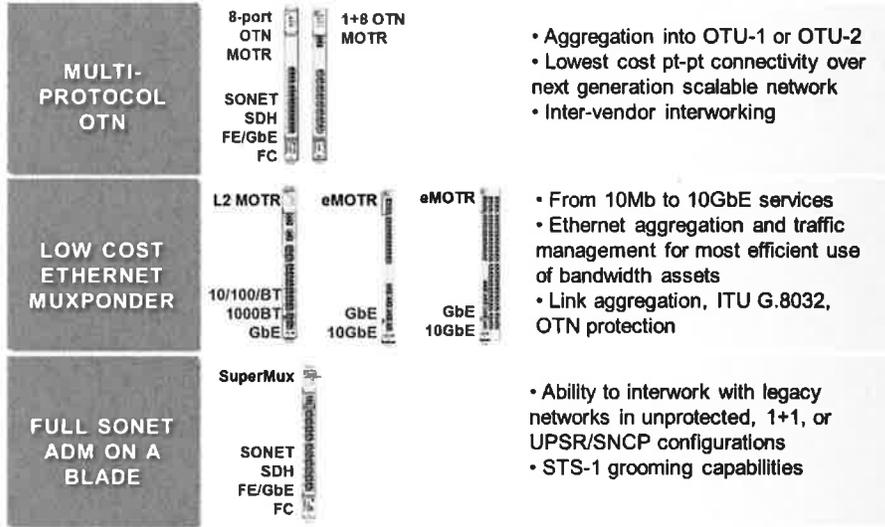
5.2.4.2 Edge Optical Switches — Provide entry points into the enterprise or service provider core networks.

Ciena Response: All the features described above in section 5.2.4.1 for the 6500 apply here as well for Edge Optical Switches. The 6500 provides multiple form factors with interchangeable modules. The 6500 2-slot and 7-slot shelves shown below are ideal for providing entry points into the enterprise or service provider core networks while the 14-slot shelf is ideal for larger locations requiring multiple degrees and more than a few wavelengths. The 32-slot shelf is designed for service provider networks.



Ciena’s 10G/40G/100G transponders can all be used in the 6500 2-slot or 7-slot shelf. Ciena also has muxponders that incorporate both layer 1 Ethernet transport as well as layer 2 Ethernet switching that provide Carrier Ethernet services. A Muxponder is simply a multiplexer with an integrated transponder for aggregating lower speed circuits onto a wavelength. Port densities range from 8 x GbE Ethernet ports on a layer 1 module to up to 40 x GbE on our eMOTR layer 2 module. Data center protocols such as Fibre Channel, FICON, ESCON, ISC-3p, PSIFB (5G Infiniband), etc. are also supported on the 6500 platform.

Muxponders to Meet All Your Needs



5.2.4.3 Optical Network Management — Provides capabilities to manage the optical network and allows operators to execute end-to-end circuit creation.

Ciena Response: Ciena’s OneControl Unified Management System unites the management of Ciena’s Carrier Ethernet Solutions, Packet-Optical Switching, and Packet-Optical Transport product portfolios under a single comprehensive solution. With its unique toolset of comprehensive management features, OneControl puts the control of critical networks at the operator’s fingertips. Through a unified GUI and common management model, Network Operations Center (NOC) operators can rapidly deploy new service offerings that cut across domains (access, metro, core, and subsea) and coordinate across network protocol layers (photonic, transport, and packet) to ensure efficient use of critical network assets and bandwidth optimization.

This efficiency provides comprehensive management and control from the access customer hand-off points, through the metro, into the intelligent core, and across subsea networks. The OneControl GUI allows NOC personnel to create and activate end-to-end services at the optical layer—OTN/SONET/ SDH and Layer 2 services such as E-LAN/E-Line. Once enabled, OneControl provides complete visualization of the entire end-to-end service multi-layer correlation, facilitating proactive root cause analysis and troubleshooting.

OneControl Technology Refresh

OneControl provides a technology refresh on both the server architecture and the client to ensure OneControl provides a scalable, extendable, and useable solution.

OneControl Server Technology — The OneControl Server is built with a Service-Oriented Architecture (SOA). SOA is a set of principles and methodologies for designing and developing software in the form of interoperable services. These services are well defined business functionalities that are built as software components (discrete pieces of code and/or data structures) that can be reused for different purposes.

SOA design principles are used during the phases of systems development and integration. (source: www.wikipedia.com)

For OneControl, the SOA paradigm enables the future ability to deliver componentized solutions without requiring a full system upgrade. This capability will allow the software delivery mechanism to be more modular and customizable. This also enables agile accommodation of new feature content because the entire system does not need to be redesigned.

The server is built with a well-defined J2EE Enterprise Application Server, which enables the OneControl system to focus on feature functionality rather than the communication protocols within the system.

J2EE Application Servers are used in many Web applications that need to meet the demands of millions of transactions per second, and throughout many industries to ensure scalability. Through the use of the application server, OneControl can scale to meet any customer deployment requirements.

OneControl Client Technology – The OneControl Client is built with newer, Web-enabled technologies that provide the ability to present a new user experience and enable both a standalone client and a Web-enabled client in the future.

The technology allows OneControl to provide a user-flexible GUI navigation paradigm similar to the latest Web interfaces. The user can decide to manage the OneControl GUIs through a single window tab-based approach or a multi-window approach, depending on their requirements. The technology also provides enhanced graphical “widgets” that enable OneControl to provide a better user experience through the use of the GUI, and more customizable views per user.

Several OneControl servers using multiple software releases can be controlled using the same client hardware, as the client architecture allows multiple OneControl clients at different software releases to be installed in the same time.

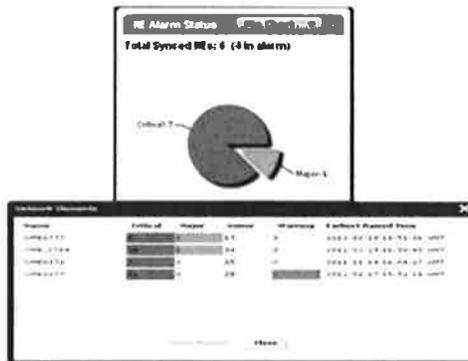
OneControl Executive Dashboard

The Executive Dashboard provides the user with a set of definable widgets and offers a customized view of the most important aspects of the network in a single screen. From this launch point, users can take control quickly and efficiently zero into the trouble spots in their network, diagnose a fault, and improve the mean time to repair the fault. New releases of OneControl introduce new widgets (based on customer feedback) that enable a summarized view of the network from different aspects and attributes of the managed objects in the network. The dashboard is broken into two areas: a resource area and a summary area.

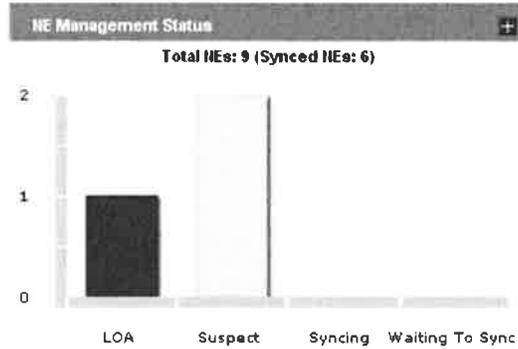


OneControl Dashboard Summary – Network Overview

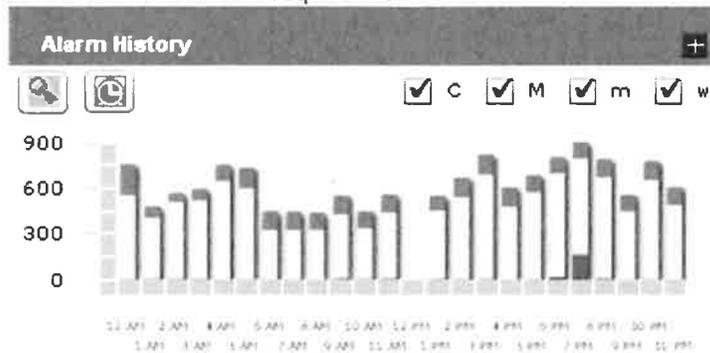
The Network Summary panel of the dashboard provides the following graphical widgets that offer specific details on the resources (Network Elements [NEs], facilities, communication) in the network.



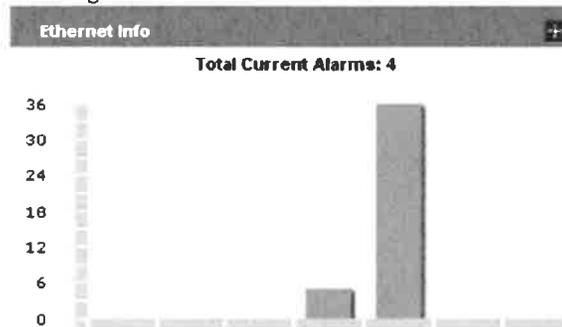
NE Alarm Status – Provides a high-level count of the number of NEs in alarm based on its highest severity alarm. Through a single button click, the user can see which NEs are in an alarm state without having to scroll through an alarm list.



NE Management Status – Provides a high-level graphical count of the management status of the NEs that are deployed. The user will get a simple, quick view of the NEs’ management status without having to view a table of data or hunt through a map. Through a single button click, the user then can get a filtered list of the affected NEs for the state requested.



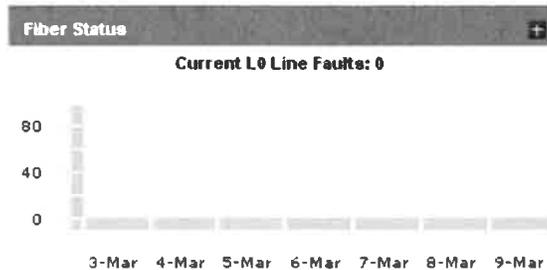
Alarm History – Provides a graphical alarm history of the network, allowing the user to view by the day or by the hour. The user then can go to a filtered view of the alarms based on the timeframe required.



Ethernet Info – For Carrier Ethernet devices, this graph provides a high-level historical timeline and current view of the service failure alarms and events, including G8032 ring switches and Continuity Check Message (CCM) failures. The user then can launch the alarms/events for the required timeframe.

Provisioning Restricted		
Total Blocked NE: 1		
Node	Component	Time
OME_0784	DOC-22-2	2012-02-29 16:25:37

Provisioning Restricted – Provides the users a view of failures against any Domain Optical Controller (DOC) that causes provisioning to be blocked or reduced in the photonic network, time-stamped according to when the failure occurred.



Fiber Status – Provides the users a high-level historical timeline and current view of any high-capacity (Wavelength Division Multiplexing [WDM]) failures in the network. The user then can launch the alarms for the required timeframe.

OneControl Dashboard Summary – EMS Overview

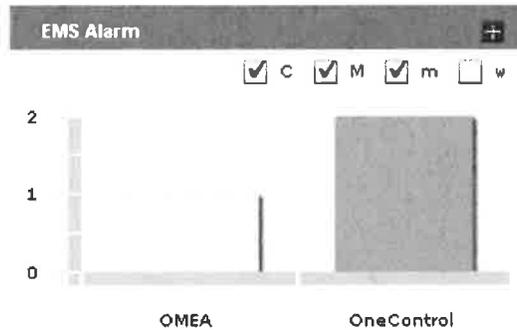
The Element Management System (EMS) Overview provides the user with the following graphical widgets that gives specific details on the EMS application and the server on which it runs.

EMS Status			
OneControl GR State: disabled			
NE Managers			
Name	IP	Type	State
OMEA_king	10.92.18.61	OMEA	NORM

EMS Status – Provides a graphical view of all the sub-EMS systems in the network and a high-level view of the status of the EMS system. The EMS Status also provides a state of the geographical redundancy for OneControl. The widget allows the user to have a single view of the status of the EMS systems without having to check on each EMS separately.

EMS TCA	
TCA's Enabled: 0 (Exceeded: 0)	
TCA Category	Exceeded Count

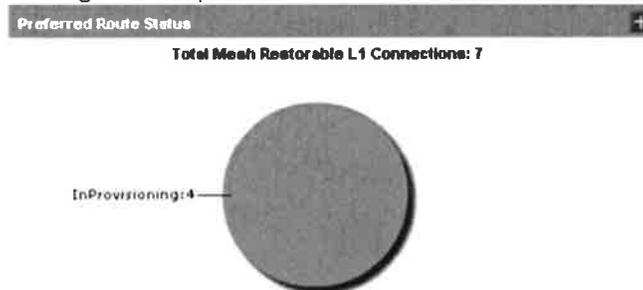
EMS Threshold Cross Alerts (TCAs) – Provides the user a consolidated view of all the EMS TCAs that are active in the system. The widget allows the user to view any threshold that has been exceeded. Through a single click, the user can access the application to provision the TCAs or view the ones that are translated into system-level alarms.



EMS Alarms – Provides the user a consolidated graphical view on the number of network management alarms in the OneControl and sub-EMS systems. This provides a quick view on the health of the EMS systems without having to scroll through a list of alarms.

OneControl Dashboard Summary – Connection Management Overview

The Connection Management Overview provides the user with a consolidated graphical view on the status of the connections managed by OneControl (for R2.1, control plane SONET/SDH network connections are supported). The goal of this area is to allow those operators who have responsibilities for network connection management a quick view on the status and states of the connections.



Home Route Status – Provides the user a graphical view of the connections that are not on their preferred path. For Control Plane connections, the home route represents the provisioned path for the circuit. This widget enables network operators to easily view how many circuits are not on their provisioned path and might need to be reverted. Through a single click, users can launch to the circuit list represented by the area selected, saving time in troubleshooting those connections.



Connection State – Provides the user a graphical view of the connection states in the network. From this view, the operators can get a quick view of the connection in the network and failures of those connections. The widget provides a single click to launch the circuit list for the represented area without the user having to find and/or filter for these details.

OneControl Dashboard Summary – Alarm Summary Overview

The Alarm Summary in the dashboard provides operators of the network a view of the alarms that have been raised over the past 45 minutes (configurable to three hours). Operators often request some way to know if something occurred in the network while they were not watching or have stepped away from a terminal. The Alarm Summary indicates not only the current total of new (unacknowledged) and outstanding (all) alarms, but also provides a view of the alarms that have been raised over the last three configured time periods. In this way, the operator can “catch” if an alarm was raised and cleared before they had time to observe it. Today, operators would need to build special tools and scripts for this level of visibility into the network; With Alarm Summary, the data is easily available.



Each alarm count has a link to a filtered view of the alarms that are selected. This enables a quick way for operators to see what has just occurred in the network without having to scroll through alarm tables or build complex filters.

OneControl Dashboard Resource – Overview

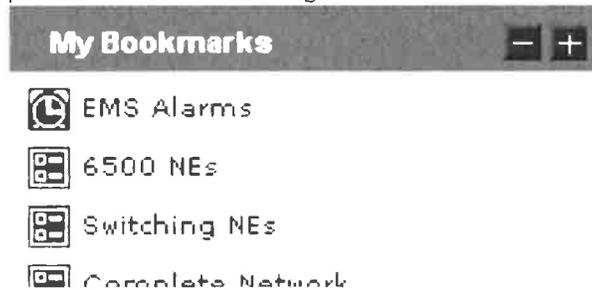
The resource panel of the dashboard provides graphical widgets that are customized to the specific operator’s task. The resource area of the dashboard includes the following graphical widgets:



Recent Activities – The recent activities widget offers the user a log of activities that user has completed during their current session. This allows a user to know what they have completed over time without having to filter through event/logs.



Support Center – This widget provides hyperlinks to Ciena resources online. These resources include the customer portal, which allows users to open support tickets with Ciena. This will save the operators time and effort by opening support tickets without leaving the tool.



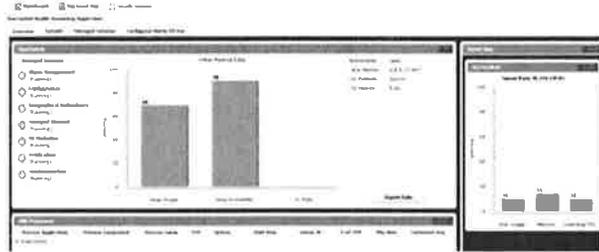
My Bookmarks – This widget provides users with the ability to bookmark or “hyperlink” applications with the associated filters so a user can launch the application quickly with the specified filter. This gives users and operators an easy way to get into applications and views of the applications they use most often.



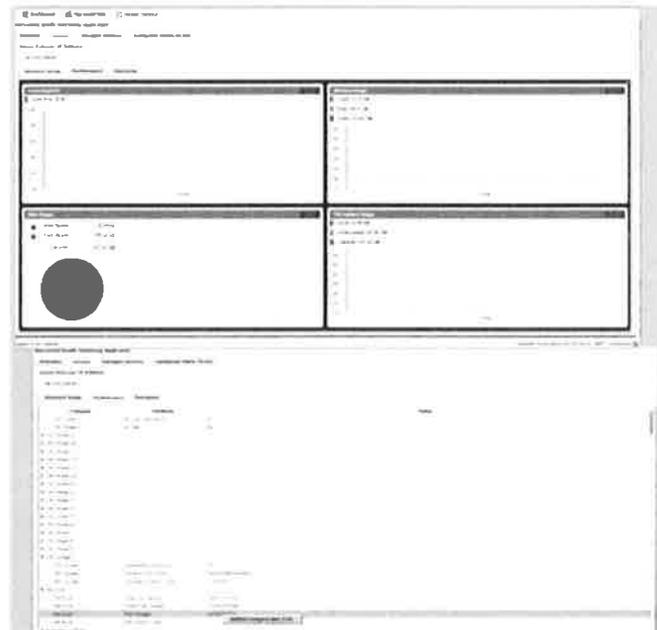
Watch List – This is one of the most powerful tools in the OneControl Dashboard. This widget allows operators and users to set up specific filters (alarms and control plane connections for OneControl R2.1) for alarms and events in the network, have OneControl watch for these events, and alert the users or operators when they occur. OneControl will put the event into the watch list until the user clears the view, not when it is cleared in the network. Operators can create an event watch without continually having to review historical alarms and events. This will save the user time and effort and will increase confidence in the network’s stability and operations.

OneControl EMS Health Monitor

The OneControl base platform provides an EMS Health Monitor that monitors the status of the EMS systems and the servers on which they run. The Health Monitor provides a view of what is occurring within the OneControl platform. With previous EMS systems, this view would require a user to log into the server’s underlying operating system and perform specific shell/script commands.

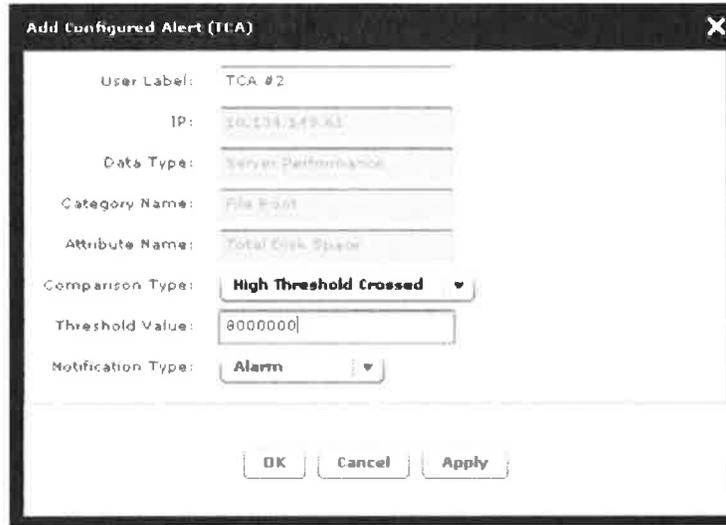


Overview Tab – Using this tab in the Health Monitor, the operator can quickly see the server’s Java and physical (disk and memory) resource utilization, so any issues within the server can be identified without having to run specialized scripts and/or commands directly on the server, saving the operator time and effort.



Servers Tab – This tab offers a simple graphical timeline display of the physical aspects of each server managed by the OneControl Health Monitor, including the load/CPU, memory, disk, and file system usage.

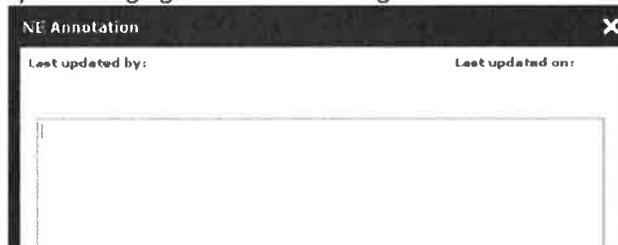
The servers tab also provides a look at the raw data of from the server. Administrators can review the data, but OneControl allows them to create an EMS TCA for each measured attribute.



EMS TCAs – One of the unique features of OneControl is the ability to set TCAs based on measured attributes. The administrator of the network can set up alarms, events, or alerts based on whether the specified measured value exceeds or falls below a specified value. The appropriate notification will be created in OneControl, eliminating the need to watch the server’s performance or create specialized scripts for notifications.

OneControl GUI Enhancements

OneControl provides many other GUI enhancements that reduce the user’s need to touch the network or increase their efficiency in managing and administrating the network.



Annotation Support – OneControl offers the ability to add annotations or notes on most of the objects within the OneControl system. This provides operators with a way to add specific notes and details about the different objects in the network, and can function as a journal over time. This functionality allows operators to communicate about activities or specific objects throughout the network that may have activities associated with them.



Integrated Troubleshooting Procedures – The integrated troubleshooting procedures allow operators to open the Ciena help documentation directly to the trouble-clearing procedures for the alarm being highlighted. This drastically reduces troubleshooting time, even when operators are not familiar with the managed network.

In OneControl R2.1, operators have the ability to launch troubleshooting procedures for OneControl alarms, which will be expanded into network alarms in later OneControl releases.

Benefits of the OneControl Base Platform

The OneControl base solution offers comprehensive network and service management for end-to-end Ciena networks. The following value-added applications, functionality, and attributes are provided as part of the base solution offering:

- > Increased scalability through technology refresh and a hierarchical architecture
- > Unified network management for the Ciena’s Packet-Optical Transport, Packet-Optical Switching, and Carrier Ethernet Solutions portfolios
- > Executive dashboard with a birds-eye view of components status and all current issues/ exceptions requiring action
- > Expandability platform that allows Transport (Layer 0), switching (Layer 1) and Carrier Ethernet (Layer 2) services management, control plane-enabled networks, and increased flexibility in adding new apps in the future.

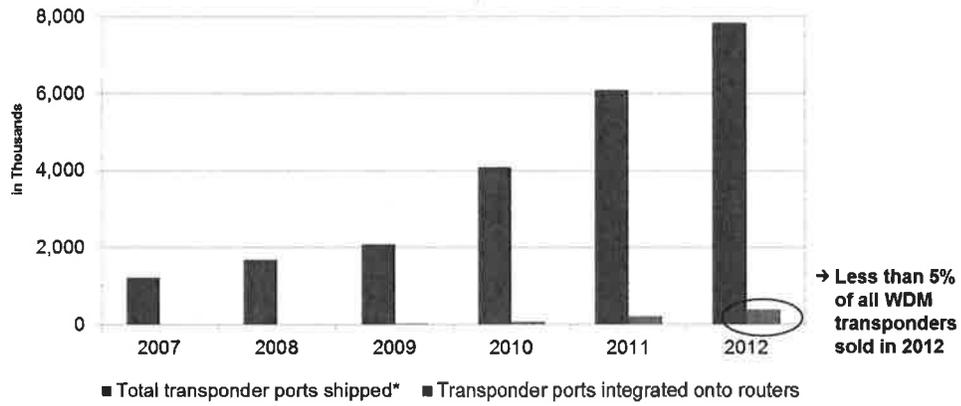
5.2.4.4 IP over DWDM (IPoDWDM) — A device utilized to integrate IP Routers and Switches in the OTN (Optical Transport Network).

Ciena Response: Ciena believes that there should be a clear demarcation between the IP router and the OTN switch. Integrating the DWDM optics into an IP router has many disadvantages. For example:

1. Lack of Performance Monitoring data points at the OTN level to troubleshoot WAN problems.
2. Distance limitations – Ciena’s OTN transponders have better performance and longer reach than typical IPoDWDM interfaces built into routers.
3. IPoDWDM wavelengths need to be regenerated more often
4. Since the transponder has been decoupled from the DWDM photonic system, troubleshooting becomes much more complex
5. Lack of electronic dispersion compensation built into the IPoDWDM optics requires the addition of Dispersion Compensating fiber in the network. This increases span loss as well as latency, driving the need for more amplifiers and driving up cost.
6. IPoDWDM wavelengths do not support OTN switching. Bandwidth can be stranded using IPoDWDM. Cannot make best use of wavelength’s capacity whereas multiple service types can be multiplexed onto Ciena’s OTN muxponders.
7. Protection switching is performed at layer 3 instead of layer 1, introducing much longer switching times.
8. IPoDWDM only works when using the same vendor’s Routers and Photonic systems. This eliminates any flexibility in vendor selection and potentially forcing the use of inferior technology.
9. Guard bands are required between 10G and 100G IPoDWDM wavelengths reducing the overall wavelength capacity of the system. Ciena supports 10G/40G/100G with no guard band restrictions.
10. IPoDWDM routers must be forklift upgraded to go from 10G to 100G. Ciena’s 6500 supports 10G/40G/100G in the same shelf.

In summary, IPoDWDM is not a desirable approach to building DWDM networks. The industry has yet to adopt this philosophy as can be seen in the number of IPoDWDM transponders sold to date.

State of Utah Contract Number AR612



*includes 10G, 40G, and 100G interfaces

Attachment B-2 (from 5.2.8 – Switches Requirements.)

5.2.8 SWITCHES — Layer 2/3 devices that are used to connect segments of a LAN (local area network) or multiple LANs and to filter and forward packets among them.

5.2.8.1 Campus LAN – Access Switches — Provides initial connectivity for devices to the network and controls user and workgroup access to internetwork resources.

Ciena Response: Ciena proposes that this network portion be addressed with one of the following devices: **CN3902, CN3916, CN3916CR, CN3931, CN3940, CN5150, CN5142, CN5160, CN5410**. All of these devices provide Service Provider level feature sets. These features provide the network operator with the following capabilities:
Service bearer plane testing and verification
Service Level assurance

The following are some of the features a campus LAN access switch should support:

- Security
- i. SSHv2 (Secure Shell Version 2)
Ciena Response: Comply. All Ciena Ethernet devices support SSHv2.
- ii. 802.1X (Port Based Network Access Control)
Ciena Response: Comply.
- iii. Port Security
Ciena Response: In addition to 802.1x for port security, each port can be configured for MAC based security using a static MAC definition on the port.
- iv. DHCP (Dynamic Host Configuration Protocol) Snooping
Ciena Response: Comply. L2 DHCP Relay can also be used to reduce DHCP broadcast traffic and spoofing attacks by utilizing trusted ports with option 82. Trusted ports are used to indicate that a port or group of ports should be trusted when analyzing client DHCP broadcasts. A list of trusted client ports and a list of trusted server ports can be configured manually using the dhcp l2-relay-agent set command.
- VLANs
Ciena Response: Comply. All proposed devices can support 4094 VLANs per port.
- Fast Ethernet/Gigabit Ethernet
Ciena Response: Comply.
- PoE (Power over Ethernet)
Ciena Response: Partially Comply. For PoE requirements, an adjunct PoE injector can be implemented.
- link aggregation
Ciena Response: Comply.
- 10 Gb support
Ciena Response: Comply.
- Port mirroring
Ciena Response: Comply. The transmit and receive of any port can be mirrored to any other port.
- Span Taps
Ciena Response: Comply. The transmit and receive of any port can be mirrored to any other port.
- Support of IPv6 and IPv4
Ciena Response: Comply. The Ciena devices support IPv4/6 for network management. For service offerings, IPv4 and IPv6 routing should be handled by the routing architecture defined in section 5.2.5. The Layer 2 access layer network should have minimized complexity and focus on Ethernet service delivery.
- Standards-based rapid spanning tree
Ciena Response: Comply. Comply, though not recommended. Spanning tree networks eventually result in network loops. To avoid this, Layer 2 transport requirements for vlans should be executed using G.8032 or MPLS-TP.

- Netflow Support (Optional).
Ciena Response: Netflow is a Layer 3 based service that adds complexity. Service assurance at Layer 2 of the network can be implemented using a standards based y.1564sam.

5.2.8.2 Campus LAN – Core Switches — Campus core switches are generally used for the campus backbone and are responsible for transporting large amounts of traffic both reliably and quickly.

Ciena Response: Ciena proposes that this network portion be addressed with one of the following devices: **CN5150, CN5160**. All of these devices provide Service Provider level feature sets. These features provide the network operator with the following capabilities:

Service bearer plane testing and verification

Service Level assurance

Core switches should provide:

- High bandwidth
Ciena Response: Comply.
- Low latency
Ciena Response: Comply.
- Hot swappable power supplies and fans
Ciena Response: Comply.
- Security
 - i. SSHv2
Ciena Response: Comply.
 - ii. MacSec encryption
Ciena Response: Does not comply.
 - iii. Role-Based Access Control Lists (ACL)
Ciena Response: ACLs are required in Layer 3 network. These add unnecessary complexity to a Layer 2, Ethernet transport network. Carrier Ethernet service delivery focuses on service transport using standards based bandwidth profiles to transport and segregate customer’s networks.
- Support of IPv6 and IPv4
Ciena Response: Comply. The Ciena devices support IPv4/6 for network management. For service offerings, IPv4 and IPv6 routing should be handled by the routing architecture defined in section 5.2.5. The Layer 2 access layer network should have minimized complexity and focus on Ethernet service delivery.
- 1/10/40/100 Gbps support
Ciena Response: Comply. The core switch family recommended supports speeds up to 10Gbps while the CN5410 supports speeds up to 100Gbps
- IGP (Interior Gateway Protocol) routing
Ciena Response: Ciena recommends that the network layers be evaluated for efficiency and optimized for service transport.
- EGP (Exterior Gateway Protocol) routing
Ciena Response: Ciena recommends that the network layers be evaluated for efficiency and optimized for service transport.
- VPLS (Virtual Private LAN Service) Support
Ciena Response: Ciena recommends that the network layers be evaluated for efficiency and optimized for service transport.
- VRRP (Virtual Router Redundancy Protocol) Support
Ciena Response: Ciena recommends that the network layers be evaluated for efficiency and optimized for service transport. Layer 2 redundancy can be supported using multi chassis lag.
- Netflow Support.

Ciena Response: Netflow is a Layer 3 based service that adds complexity. Service assurance at Layer 2 of the network can be implemented using a standards based y.1564sam.

5.2.8.3 Campus Distribution Switches — Collect the data from all the access layer switches and forward it to the core layer switches. Traffic that is generated at Layer 2 on a switched network needs to be managed, or segmented into Virtual Local Area Networks (VLANs), Distribution layer switches provides the inter-VLAN routing functions so that one VLAN can communicate with another on the network. Distribution layer switches provides advanced security policies that can be applied to network traffic using Access Control Lists (ACLs).

Ciena Response: Ciena proposes that this network portion be addressed with one of the following devices: **CN5150, CN5305, , CN5142, CN5160, CN5410**. All of these devices provide Service Provider level feature sets.

- High bandwidth
Ciena Response: Comply.
- Low latency
Ciena Response: Comply.
- Hot swappable power supplies and fans
Ciena Response: Comply.
- Security (SSHv2 and/or 802.1X)
Ciena Response: Comply.
- Support of IPv6 and IPv4
Ciena Response: Comply. The Ciena devices support IPv4/6 for network management. For service offerings, IPv4 and IPv6 routing should be handled by the routing architecture defined in section 5.2.5. The Layer 2 access layer network should have minimized complexity and focus on Ethernet service delivery.
- Jumbo Frames Support
Ciena Response: Comply. All devices support a maximum frame size of 9216 bytes.
- Dynamic Trunking Protocol (DTP)
Ciena Response: DTP is a Cisco proprietary protocol that does not provide vendor interop. Ciena recommends reviewing the demands of the service offering requirements. The resulting analysis will remove the necessity of protocols like DTP that provide no value and add operational complexity.
- Per-VLAN Rapid Spanning Tree (PVRST+)
Ciena Response: PVRST is a Cisco proprietary protocol. MSTP is the standardized version that allows vendor interoperability if that type of architecture is desired. However, MSTP is not recommended in network architectures except as a corner case. The recommended network design is to remain simple while offering the most robust service offerings possible. G.8032 and MPLS-TP are both better suited for robust vlan transport.
- Switch-port auto recovery
Ciena Response: Auto recovery is a mechanism used in spanning tree networks. Spanning tree is not a recommended Ciena architecture.
- NetFlow Support or equivalent
Ciena Response: Netflow is a Layer 3 based service that adds complexity. Service assurance at Layer 2 of the network can be implemented using a standards based y.1564sam.

5.2.8.4 Data Center Switches — Data center switches, or Layer 2/3 switches, switch all packets in the data center by switching or routing good ones to their final destinations, and discard unwanted traffic using Access Control Lists (ACLs), all at Gigabit and 10 Gigabit speeds. High availability and modularity differentiates a typical Layer 2/3 switch from a data center switch. Capabilities should include:

Ciena Response: Ciena will not be responding to this section.

- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- Ultra-low latency through wire-speed ports with nanosecond port-to-port latency and hardware-based Inter-Switch Link (ISL) trunking
- Load Balancing across Trunk group able to use packet based load balancing scheme
- Bridging of Fibre Channel SANs and Ethernet fabrics
- Jumbo Frame Support
- Plug and Play Fabric formation that allows a new switch that joins the fabric to automatically become a member
- Ability to remotely disable and enable individual ports
- Support NetFlow or equivalent

5.2.8.5 Software Defined Networks (SDN) - Virtualized Switches and Routers —

Technology utilized to support software manipulation of hardware for specific use cases.

5.2.8.6 Software Defined Networks (SDN) — Controllers - is an application in software-

defined networking (SDN) that manages flow control to enable intelligent networking. SDN controllers are based on protocols, such as OpenFlow, that allow servers to tell switches where to send packets. The SDN controller lies between network devices at one end and applications at the other end. Any communications between applications and devices have to go through the controller. The controller uses multiple routing protocols including OpenFlow to configure network devices and choose the optimal network path for application traffic.

Ciena Response: Ciena is actively developing standards and customer implementations for SDN. This includes implementing OpenFlow on the 5430.

5.2.8.7 Carrier Aggregation Switches — Carrier aggregation switches route traffic in addition to bridging (transmitted) Layer 2/Ethernet traffic. Carrier aggregation switches' major characteristics are:

Ciena Response: Ciena proposes that this network portion be addressed with one of the following devices: **CN5142, CN5150, CN5160, CN5305, CN5410**. All of these devices provide Service Provider level feature sets. These features provide the network operator with the following capabilities:

Service Level assurance

Standards based service offerings (E-Line/E-LAN + MEF compliant bandwidth profile definitions)

- Designed for Metro Ethernet networks
- **Ciena Response: Comply.**
- Designed for video and other high bandwidth applications
- **Ciena Response: Comply.**
- Supports a variety of interface types, especially those commonly used by Service Providers

Ciena Response: Comply. Service providers are using MEF as the model for Ethernet service delivery. This model focuses on:

- Delay, frame loss, jitter measurements
- Bandwidth profiles based EVC, DSCP, CoS, VLAN and port
- Service architectures of E-Line/E-LAN/E-Access

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Capabilities should include:

- Redundant Processors
Ciena Response: Comply. The following devices support redundant processors: 5305, 5410.
- Redundant Power
Ciena Response: Comply.
- IPv4 and IPv6 unicast and multicast
Ciena Response: Comply. The Ciena devices support IPv4/6 for network management. For service offerings, IPv4 and IPv6 routing should be handled by the routing. The Layer 2 aggregation network should have minimized complexity and focus on Ethernet service delivery.
- High bandwidth
Ciena Response: Comply.
- Low latency
Ciena Response: Comply.
- Hot swappable power supplies and fans
Ciena Response: Comply.
- MPLS (Multiprotocol Label Switching)
Ciena Response: Partially Comply. Ciena supports and recommends MPLS-TP.
- BGP (Border Gateway Protocol)
Ciena Response: BGP is only required to carry Layer3 services. These service offering is not necessary on a Carrier Ethernet service network.
MPLS-TP utilizes an IGP (ISIS or OSPF)
- Software router virtualization and/or multiple routing tables
Ciena Response: Ciena devices implement a Layer 2 based virtual switching architecture. This architecture segregates broadcast domains within a port and across multiple ports.
- Policy based routing
Ciena Response: Routing at this layer of the network should not be required. Ciena recommends evaluating the network architecture for the functionality and service requirements at each layer.
- Layer 2 functionality
 - i. Per VLAN Spanning Tree
Ciena Response: PVRST is a Cisco proprietary protocol. MSTP is the standardized version that allows vendor interoperability if that type of architecture is desired. However, MSTP is not recommended in network architectures except as a corner case. The recommended network design is to remain simple while offering the most robust service offerings possible. G.8032 and MPLS-TP are both better suited for robust vlan transport.
 - ii. Rapid Spanning Tree
Ciena Response: Comply, though not recommended for use at this layer of the network. Ciena recommends using G.8032 or MPLS-TP.
 - iii. VLAN IDs up to 4096
Ciena Response: Comply.
 - iv. Layer 2 Class of Service (IEEE 802.1p)
Ciena Response: Comply.
 - v. Link Aggregation Control Protocol (LACP)
Ciena Response: Comply.
 - vi. QinQ (IEEE 802.1ad)
Ciena Response: Comply.

Layer 2 Carrier Ethernet: CESD

Ciena's CESD (Carrier Ethernet Service Delivery) Portfolio is a standards based connection oriented Ethernet architecture. Ciena's CESD delivers all the advanced functionality required in a Carrier Ethernet

transport network, however in a simpler manner than other solutions. This enables rapid turn-up of services and ease-of-management and troubleshooting.

CESD Features & Benefits

Ciena's Carrier Ethernet architecture has been designed to deliver cost-effective capacity, scalability, resilience and manageability for Advanced Carrier Ethernet Services.

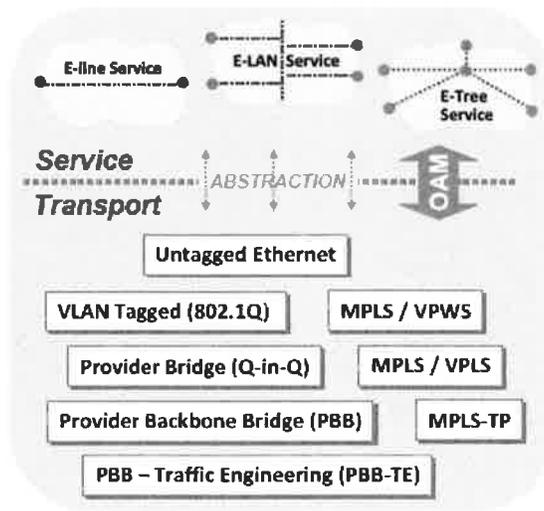
The network can be deployed quickly and efficiently, scaling to meet new subscriber demand, and providing a highly manageable and programmable network architecture to address an ever changing telecommunications environment.

There are a number of key technology advantages that Ciena's solution has over other Industry solutions:

1. Full interworking between all major Carrier Ethernet standards – Not only is Ciena's solution a True Carrier Ethernet® Transport solution, but it also supports a full set of interworking that is certified CE 2.0 by the Metro Ethernet Forum (MEF)..
2. Highly scalable and simple solution – a combination of industry leading port and service densities, as well as the power of a unique Virtual Switching architecture allows WSCA-NASPO to maximize the number of services delivered in the network. Being a pure Layer 2 solution we provide the most efficient and simple packet-based transport architecture, alleviating scaling issues seen with other transport technologies.
3. Seamless OSS integration and unique automation features – Ciena's Network management system, OneControl, eases the management of a Carrier Ethernet service network, enabling northbound applications to orchestrate and direct the service management process while the OneControl platform deploys, delivers and sustains Carrier Ethernet services. Coupled with the extensive experience in integrating with back-office systems (including the major tier 1 US Carriers), OneControl provides the quickest service turn-up, speeding up time to revenue and reducing overall operational costs. Both the management system and the devices have been designed to allow for extensive automation via the use of advanced service templates and configuration downloads.
4. Full set of Carrier-class OAM capabilities – Our CESD solution includes the industry's most comprehensive and proven OAM solution to not only minimize overall operational costs, but also to guarantee SLA's to provide value added services to your customers.
5. Fastest growing Ethernet Access solution vendor – HeavyReading has endorsed Ciena as the vendor with the fastest growing deployment of Carrier Ethernet for Carrier Ethernet access in the market (HeavyReading Quarterly Tracker 4 quarters to Q3'10), with a number 1 market share in Ethernet access over fiber solutions. Ciena has the industry's most expertise and experience in deploying world class, next generation Carrier Ethernet networks.

Transport and Protection Mechanisms

The unique advantage of Ciena's solution is that it will allow WSCA-NASPO to push for the standard transport and protection mechanism it prefers for their network. Ciena provides the greatest flexibility for building and deploying Ethernet networks by abstracting the services from the access or transport network technology and supporting all MEF services across any topology and different tunnel encapsulation formats, as shown below.



Below are the supported Standards and overview of their operation.

G.8032

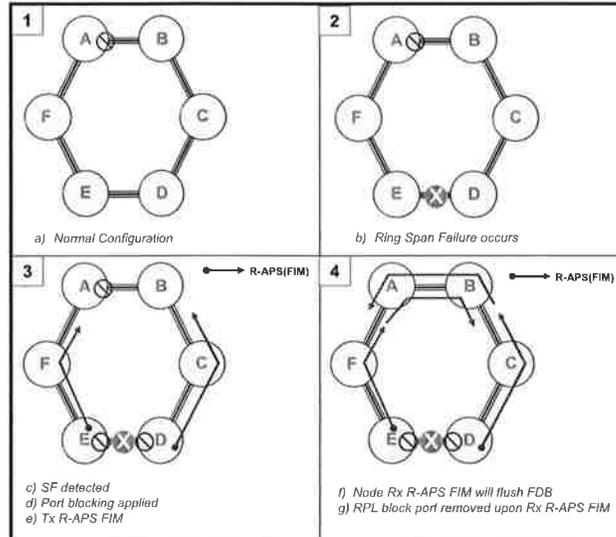
Using G.8032 Ethernet Ring Protection, all services (E-Line or E-LAN) are intrinsically protected with the ring protection mechanism provided in the standard. Protection times are achieved in less than 50ms for rings up to 24 nodes in size. It should be noted that Ciena's implementation of G.8032 allows for connection of rings over methods other than dark fiber, such as leased lines and DWDM. Failure detection in such cases is triggered by IEEE 802.1ag CCM messages.

Protection switching in G.8032 is triggered once a fault has been detected on the ring. Faults include a nodal fault, or a ring span fault (whether unidirectional or bidirectional).

Nodes adjacent to the fault point will notify the other nodes on the ring of the fault. These nodes will install an automatic protection channel block facing the fault point, and periodically transmit ring automatic protection switching (R-APS) frames indicating a fault.

Upon reception of an R-APS fault message, downstream ring nodes flush their Forwarding Database (FDB). If the downstream node had an operationally assigned channel block, it will be removed. The flushing of the ring node FDB occurs once.

The sequence of events involved G.8032 protection switching is illustrated in the below figure:



1) shows the ring in normal (“closed”) state. Ring node A is the owner of the operationally assigned channel block port. If a fault occurs between ring nodes E and D (i.e., ring span ED), as depicted in sequence (2), the ring nodes adjacent to the fault point will install a channel block facing the fault point, and start to periodically transmit a R-APS fault indication message (FIM). This is illustrated in sequence (3). When ring node A, which is the operationally assigned channel block owner receives an R-APS FIM, it will remove its channel block. The resulting ring configuration is illustrated in sequence (4). Full loop-free connectivity is restored over the ring, once a fault is detected and protection switching is triggered. Once the fault is detected, sequence (3) and (4) occurs within 50ms, thus providing deterministic sub-50ms protection switching.

PBB-TE

Provider Backbone Bridges – Traffic Engineering (PBB-TE) provides traffic-engineered tunnels through a Carrier Ethernet Network. This connection-oriented approach offers the ideal infrastructure for wireless backhaul, DSL aggregation, and Ethernet-based virtual private networks (VPN). A Ciena PBB-TE solution has the following advantages:

Scalable: PBB-TE leverages PBB which dramatically increases the maximum possible service instances in a network from 4094 (with Q-in-Q) to 16 million, thanks to the 24-bit service tag that separates the service provider's MAC address space from the end customer's.

Deterministic: PBB-TE allows service providers to create point-to-point tunnels, adding connection oriented attributes to traditionally broadcast-oriented Ethernet. These pre-configured pathways support bandwidth reservation and the provisioned QoS metrics that guarantee SLA's is met. Backup paths are also pre-configured, ensuring fast and predictable failover.

SONET-like: PBB-TE can switch from the working path to the protection path in under 50 ms, similar to the carrier-grade benchmark of SDH networks. Like a fast heartbeat, CFM (Connectivity Fault Management = 802.1ag) sends continuity check messages every 10 ms (configurable), to ensure rapid fault detection.

Simple: PBB-TE does not use or process Layer 3 address information; it is strictly a Layer 2 point-to-point technology. Based on well-established Ethernet switching principles, PBB-TE reuses the existing Ethernet forwarding tables, only changing how they are populated. .PBB-TE tunnel is “service agnostic” — it can carry any service type: Ethernet, IP-VPN, MPLS Pseudowires and more.

Manageable: Service providers' Operations staff expects robust OAM functionalities similar to other WAN technologies. CFM (802.1ag) offers loopbacks and link trace for troubleshooting, and continuity checks for fast fault detection.

MPLS-TP

MPLS has been widely deployed as a transport technology globally. Ciena’s advantage, as described earlier, is being technology agnostic. That is, while we believe PBB-TE is a far simpler solution to configure, troubleshoot and manage, we understand the flexibility and reasons for deployment of an MPLS-based network. While MPLS does not have the same connection oriented attributes as PBB-TE, it can be used as a transport technology, albeit with more complexity than a PBB-TE based solution.

The other emerging standard is MPLS-TP, which seeks to provide the simplicity and connection-oriented characteristics that MPLS has lacked. It is a viable alternative to PBB-TE. Ciena is fully committed to supporting MPLS-TP upon standardization (or when in a close to standard draft) to provide another mechanism for connection-oriented Ethernet.

5.2.8.8 Carrier Ethernet Access Switches — A carrier Ethernet access switch can connect directly to the customer or be utilized as a network interface on the service side to provide layer 2 services.

Ciena Response: Ciena proposes that this network portion be addressed with one of the following devices: **CN3902, CN3916, CN3916CR, CN3931, CN3940, CN3960**. All of these devices provide Service Provider level feature sets. These features provide the network operator with the following capabilities:

Service bearer plane testing and verification

Service Level assurance

Standards based service offerings (E-Line/E-LAN + MEF compliant bandwidth profile definitions)

- Hot-swappable and field-replaceable integrated power supply and fan tray

Ciena Response: Comply.

- AC or DC power supply with DC input ranging from 18V to 32 VDC and 36V to 72 VDC

Ciena Response: Comply.

- Ethernet and console port for manageability

Ciena Response: Comply. All devices support console access.

- SD flash card slot for additional external storage

Ciena Response: Does not comply. All recommended devices except the 3902 provide sufficient onboard memory to store (2) software loads.

- Stratum 3 network clock
Ciena Response:
- Line-rate performance with a minimum of 62-million packets per second (MPPS) forwarding rate
Ciena Response: Comply. PPS processing is dependent on device type. i.e.
 5150: 130.95 MPPS
 3960: 71.43 MPPS
 Devices with fewer ports and 1Gbps line rate have lower PPS processing and should be considered where the network requires.
- Support for dying gasp on loss of power
Ciena Response: Comply.
- Support for a variety of small form factor pluggable transceiver (SFP and SFP+) with support for Device Object Model (DOM)
Ciena Response: Comply.
 Ciena devices support SFP and SFP+ pluggable optics.
 DDM/DOM are interchangeable terms that provide optical monitoring.
 Ciena refers to this support as DDM: Digital Diagnostics Monitoring
- Timing services for a converged access network to support mobile solutions, including Radio Access Network (RAN) applications
Ciena Response: Comply. The CN3932, 3930,5142, and 5160 are the recommended platforms for timing services. They provides: SyncE support. PTP OC support for Freq and Phase (ToD available in 6.12). BITS for Frequency. GPS for Phase, Freq, and Phase/ToD @ 1PPS SMB.

System Timing – Feature Support Per Platform

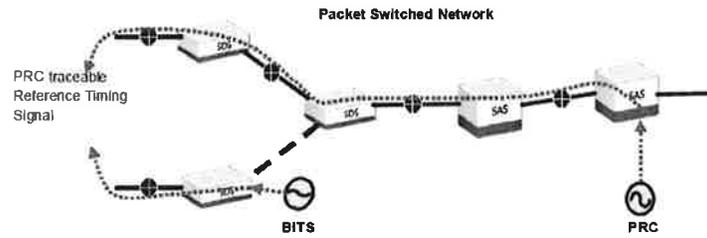
Platform	SyncE		PTP/IEEE 1588v2			External Timing Interfaces					TDM
	UNI	NNI	OC	TC	BC	BITS	GPS			1PPS SMB	
							SYNC RJ45				
	Freq	Freq/Phase/ToD	-	Freq/Phase/ToD	Freq	Phase	ToD	Freq	Phase/ToD	Freq	
5150	6.10.1	6.10.1	6.12	TBD	TBD	6.10.1 ²	x	x	x	x	x
3930-910	6.10.2 ¹	6.10.2	TBD	TBD	TBD	x	x	x	x	x	x
3931-910	6.10.2 ²	6.10.2	6.12	TBD	TBD	x	x	x	x	x	x
3930-930	6.10.1	6.10.1	6.11.0* 6.11.0* 6.12	TBD	6.12	6.10.1	6.11.0	6.12	6.11.0	6.11.0 6.12	x
3932 ³	6.11.0	6.11.0	6.11.0* 6.11.0* 6.12	TBD	6.12	6.11.0	6.11.0	6.12	6.11.0	6.11.0 6.12	6.11.0
5142 ⁴	6.11.0	6.11.0	6.11.0* 6.11.0* 6.12	TBD	6.12	6.11.0	6.11.0	6.12	6.11.0	6.11.0 6.12	x
5160 ⁵	6.11.0	6.11.0	6.11.0* 6.11.0* 6.12	TBD	6.12	6.11.0	6.11.0	6.12	6.11.0	6.11.0 6.12	x

→ All other 39xx, 51xx platforms have no HW support for these features
 → Requires *Advanced-Ethernet* license: **SyncE, BITS, GPS & TDM** timing
 → Requires *Advanced-Sync* license: **PTP** timing

² Requires 5102 module
¹ 3930-910 ports 1-4 support SyncE output only
² 3931-910 ports 5-8 support SyncE output only
³ New Platform.
⁴ OC slave only in 6.11.0

- Support for Synchronous Ethernet (SyncE) services
Ciena Response: Comply. Reference architecture:

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- Supports Hierarchical Quality of Service (H-QoS) to provide granular traffic-shaping policies
Ciena Response: Comply. Ciena devices support Hierarchical Ingress Metering. With hierarchical ingress metering, frames classify to a parent traffic profile for metering, and are fed to a child traffic profile for additional metering. Hierarchical ingress metering is supported by setting the per-port traffic profiling mode.
- Supports Resilient Ethernet Protocol REP/G.8032 for rapid layer-two convergence
Ciena Response: Comply. Ciena devices support G.8032. REP is not supported and is Cisco proprietary. Ciena has tested G.8032 interoperability with Alcatel and Juniper core devices. G.8032 is a preferred method for interconnecting core networks with access and aggregation networks. Typical failover times in campus networks are <20ms.

Attachment B-3 Scope of Work

The Solicitation is hereby modified as follows:

3.1.6 Data Communications Provider Contract Administrator and Usage Report Administrator.

As of the Effective Date, the following persons or such other representatives, address's or number's as any Party may provide to the other in writing:

Contract Administrator: Steve Darflinger (sdarflin@ciena.com)

Usage Report Administrator: Sandra Schroeder (sschroed@ciena.com)

4.6.A Authorized Data Communications Reseller. The Authorized Resellers who will be authorized to represent Contractor in receiving orders under the Master Agreement and Participation Agreement shall be limited solely to those listed on the e-Market site. The listing of resellers in the solicitation response are examples of *potential* candidates for Authorized Reseller status.

STATE OF UTAH CONTRACT NUMBER – AR612
Attachment C – Pricing
Solicitation Number JP14001
WSCA-NASPO Data Communications RFP

Vendor Name: Ciena

RFP Product Categories:

Minimum Discount Percentage:

5.2.4 OPTICAL NETWORKING

Discount % 55

5.2.8 SWITCHES

Discount % 55

Current Ciena pricing sheets, approved by the State of Utah, can be found at the following web link:

[VENDOR PRICING SHEETS CLICK HERE](#)

IMPORTANT: The minimum discount percentage listed in this attachment is for general informational purposes only and may not apply to every line item authorized under this contract. For specific item pricing, please refer to the contact price list weblink provided in this document.

Vendors are required to post state specific pricing on their hosted website or through the WSCA-NASPO eMarket center as required by solicitation JP14001, in addition to the vendor pricing sheets approved and hosted by the State of Utah's master contract summary sheet. The State of Utah vendor pricing sheets will serve as the approved base price and do not include any applicable state specific administrative fees. State specific pricing, hosted on the vendor website or WSCA-NASPO eMarketcenter may reflect authorized state specific administrative fees. No other fees are authorized under this contract. Pricing audits may be conducted at any time by the State of Utah, WSCA-NASPO, or 3rd party audit provider to ensure accurate pricing.

Per Solicitation JP14001, the following pricing/product requirements and instructions apply:

1.11 Pricing Structure

Pricing Structure: Pricing for the State of Utah WSCA-NASPO Master Agreements shall be based on the Percent Discount off the current global MSRP Schedule applicable to United States customers.

1.12 Price Guarantee Period

Price Guarantee Period: The Data Communication Provider's Discount rate shall remain in effect for the term of the WSCA-NASPO Master Price Agreement.

1.13 Price Escalation

Equipment, Supplies and Services: Data Communications provider may update the pricing on their MSRP price list one time every year after the first year of the original contract term. The WSCA-NASPO

Contract Administrator will review a documented request for a Price Schedule price list adjustment only after the Price Guarantee Period.

1.14 Price Reductions

In the event of a price decrease in any category of product at any time during the contract in a Provider's Price Schedule, including renewal options, the WSCA-NASPO Contract Administrator shall be notified immediately. All Price Schedule price reductions shall be effective upon the notification provided to the WSCA-NASPO Master Agreement Administrator.

1.20 WSCA Administrative Fee

The Contracted Supplier must pay a WSCA-NASPO administrative fee of one quarter of one percent (.25%) in accordance with the terms and conditions of the contract. The WSCA-NASPO administrative fee shall be submitted quarterly and is based on the actual sales of all products and services in conjunction with your quarterly reports. The WSCA-NASPO administrative fee must be included when determining the pricing offered. The WSCA-NASPO administrative fee is not negotiable and shall not be added as a separate line item on an invoice.

Additionally, some WSCA-NASPO participating entities may require that an administrative fee be paid directly to the WSCA-NASPO participating entity on purchases made by purchasing entities within that State. For all such requests, the fee percentage, payment method and payment schedule for the participating entity's administrative fee will be incorporated in the Participating Addendum. Data Communications Provider will be held harmless, and may adjust (increase) the WSCA-NASPO Master Agreement pricing by the fee percentage for that participating entity accordingly for purchases made by purchasing entities within the jurisdiction of the State. All such agreements may not affect the WSCANASPO fee or the prices paid by the purchasing entities outside the jurisdiction of the participating entities requesting the additional fee.

5.3.2 ADDING PRODUCTS

The ability to add new equipment and services is for the convenience and benefit of WSCA-NASPO, the Participating States, and all the Authorized Purchasers. The intent of this process is to promote "one-stop shopping" and convenience for the customers and equally important, to make the contract flexible in keeping up with rapid technological advances. The option to add new product or service categories and/items will expedite the delivery and implementation of new technology solutions for the benefit of the Authorized Purchasers.

After the contracts are awarded, additional IT product categories and/or items may be added per the request of the Contractor, a Participating State, an Authorized Purchaser or WSCA-NASPO. Additions may be ad hoc and temporary in nature or permanent. All additions to an awarded Contractor or Manufacturer's offerings must be products, services, software, or solutions that are commercially available at the time they are added to the contract award and fall within the original scope and intent of the RFP (i.e., converged technologies, value adds to manufacturer's solution offerings, etc.).

5.3.2.1 New Product from Contractors — If Contractor, a Participating State, an Authorized Purchaser or WSCA-NASPO itself requests to add new product categories permanently, then all awarded Contractors (Manufacturers) will be notified of the proposed change and will have the opportunity to work with WSCA to determine applicability, introduction, etc. Any new products or services must be reviewed and approved by the State of Utah WSCA-NASPO Contract Administrator.

5.3.2.2 Ad Hoc Product Additions — A request for an ad hoc, temporary addition of a product category/item must be submitted to WSCA-NASPO via the governmental entity's contracting/purchasing officer. Ad hoc, temporary requests will be handled on a case-by-case basis. The State of Utah WSCA-NASPO Contract Administrator must also be notified and will review and approve the addition before the purchase is finalized by the end user. The State of Utah WSCA-NASPO Contract Administrator has the final approval on any Ad Hoc product additions.

5.3.2.3 Pricelist Updates — As part of each Contractor's ongoing updates to its pricelists throughout the contract term, Contractor can add new SKUs to its awarded product categories that may have been developed in-house or obtained through mergers, acquisitions or joint ventures; provided, however, that such new SKUs fall within the Contractor's awarded product categories. Updated price lists will be reviewed and approved by the State of Utah WSCA-NASPO Contract Administrator before the revised price list is considered valid.