

Cisco Systems, Inc. Response to Request for Information



Idaho Education Network Strategy



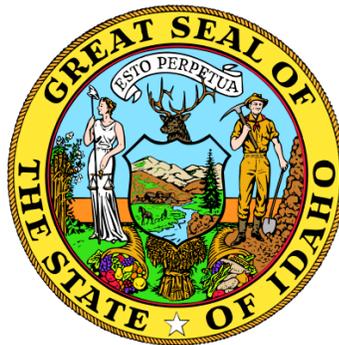
February 15, 2015



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Cover Letter

February, 15, 2015

Idaho Department of Administration
Attn: Brady Kraft: RFI Response
PO Box 83720
Boise, ID 83720-0304
Subject: Idaho Education Network Strategy

Dear Mr. Kraft:

We are pleased to provide the Idaho Department of Administration selected responses to this Request for Information. The State of Idaho has a tremendous opportunity to develop an offering that serves education, state government, local government, and that also drives economic growth. When considering the multitude of critical applications such as online testing for students, public/private cloud services for state agencies, and public safety applications for emergency responders, the Department should anticipate a huge demand for the envisioned resilient and robust State-wide network. It will take a large coordinated effort to develop and operate such an offering, but the benefits to the community are compelling. Cisco looks forward to working with the Department of Administration to provide industry expertise as Idaho realizes this opportunity for the IEN and beyond. Thank you for your support and continued partnership.

Sincerely,

Meredith Newton
Account Manager, US Sales
SLED – Northwest States Region



Legal Disclaimer

Thank you for the opportunity to submit this non-binding (other than pricing for now-available products listed in our quotes) proposal for your consideration. Please note that this proposal may include proprietary, confidential, and/or trade secret information which, if included, will be clearly marked as such in the proposal. Any information that Cisco considers to be a trade secret will not be subject to disclosure under any public records act.

This proposal is valid for a period of ninety (90) days from the date of proposal submission.

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SLED West CENIC Whitepaper

Executive Summary

With applications emerging as the lifeblood of business, Chairman and CEO John Chambers echoed Cisco's Internet of Everything blueprint by saying that every industry is becoming an application-centric industry, and the business model shift is only accelerating. With projections of 50 billion devices connected to the Internet by 2020, "this shift to an application economy is perhaps the biggest IT market transition of all."

John Chambers,
Chairman and CEO, Cisco Systems



Healthcare, education, public safety, and citizen demands are transforming government IT. The Idaho Department of Administration can meet these challenges by being prepared for mobile solutions, big data intelligence, and Idaho-based cloud services. Bringing these elements together is the power of convergence, and these factors are changing the public sector landscape for the better.

Technology convergence brings together applications, systems, and processes to help meet current needs while preparing for future innovation. This convergence is at the heart of the [Internet of Everything \(IoE\)](#), which connects people, processes, data, and things in new and innovative ways.

The IoE can offer significant benefits to Idaho, such as:

- Economic growth
- Reduced operational costs
- Improved employee, staff, citizen, and student connectivity
- Enhanced public safety
- Enhanced citizen experience
- Better student outcomes and safer learning environments.

To capitalize on these benefits, Idaho will need to build a technology roadmap that begins with converging their State IT networks. Cisco can help build a roadmap and implement each step along the way with our specific IoE offerings. Cisco has focused on IoE outcomes and helped realize customer visions around the world. In Attachment (SLED West CENIC White Paper), you will find an example of how we executed a similar plan with the California Research and Education Network (CENIC). We look forward to seeing Idaho be equally as successful as you take advantage of this astounding opportunity to enable services to every citizen, everywhere, at any time.

Cisco Response to Point-by-Point Requirements

Requirement:

Overview and Purpose

The Idaho Department of Administration (ADM), Office of the Chief Information Officer (OCIO) is seeking information from interested parties regarding the continuation and growth of the statewide education network (IEN). The State's current vision is to continue a carrier owned and operated network.

Note: This RFI is issued solely for information and planning purposes. It does not constitute a solicitation. Participation is at the option of the industry expert. Responses will not be returned, and will not be considered "offers." No contract(s) or other obligations will result from this request for information. All information that is designated as "trade secret" within a submittal will be handled according to the provisions of Idaho's Public Records Law. Responders are solely responsible for any expenses associated with responding to this RFI.

To assist providers in responding to this request for information, this RFI includes a description of the current technology, architecture, and network design.

As defined by Idaho Code 67-5745D, Idaho Education Network means "the coordinated, statewide telecommunications distribution system for distance learning for each public school, including two-way interactive video, data, internet access and other telecommunications services for providing distance learning. The term also includes connections to each institution of higher education and other locations as necessary to facilitate distance education, teacher training and other related services."

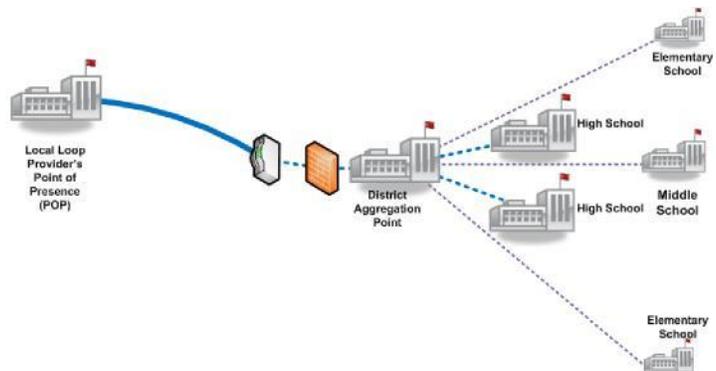
The OCIO expects responses to this RFI could provide information on how the design, construction, operation and funding of the IEN could be improved while still meeting the intent of the legislature articulated in Idaho Code 67-5745D/E. OCIO desires responses that include end-to-end detail for improving the manner in which interactive education content is delivered from Idaho's institutions of higher education to and between Idaho secondary schools. Additionally, OCIO desires responses to include end-to-end detail for expanding the network to serve all Idaho public schools and libraries.

Existing Design

1. IEN Connection Locations (School Districts) and logical local loop network architecture.

The IEN network terminates to a single aggregation point at each connected entity (i.e., School District, University, etc.) inside of the customer-provided firewall and/or filtering device. The entity then distributes the IEN provided bandwidth to each eligible building via their district maintained Metropolitan Area Network (MAN). The IEN's point of demarcation is the IEN provided router at each of the entities' aggregation point.

The local loop circuit connects the IEN router, located at the entity aggregation point, to the local service provider's "Point of Presence (POP)". Currently all local loops are provisioned using copper, fiber and microwave using both MPLS and Ethernet technologies.

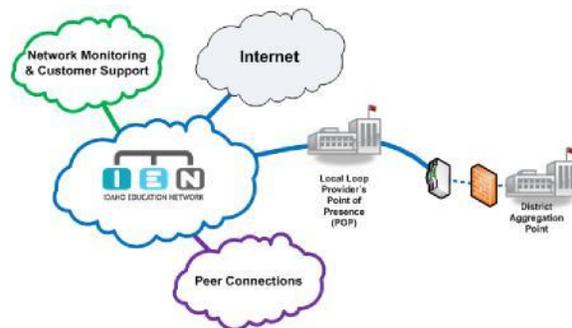


The IEN currently connects to every public school district, which contains a high school with a 12th grade, except Idaho Connects Online School and Valley School District. Bishop Kelly High School has also purchased a connection to the IEN. In future phases, connections to K-8/9 districts and public libraries may be added to the IEN architecture.

The IEN provides data-only connections to College of Southern Idaho, College of Western Idaho, Eastern Idaho Technical College, Idaho Digital Learning Academy and the Idaho State Network in this fashion. These are data-only connections and IEN districts cannot access the public Internet through these connections nor can entities connected to the IEN through peer connections access the IEN provisioned public Internet.

2. A list of all existing connected entities, address, local loop media and technologies, local loop capacities and provisioned bandwidth is provided in an attached spreadsheet labeled "IEN Connections 12-31-14.xlsx".
3. IEN Backbone, Peer and Public Internet Connections.

Current vendors provide connections from the local loop provider's POP to the IEN vendor-provided regional POPs. The circuits are then aggregated at the Level 3 facility in Boise, ID. From the Level 3 facility, the IEN is connected to redundant public Internet connections, a Customer Technical Assistance Center (CTAC) which provides central network monitoring and 24/7 customer support, and other Peer Connections.



The IEN connects to University of Idaho, Boise State University, Idaho State University, Lewis Clark State College, North Idaho College and Internet2 through a peer connection to the Idaho Regional Optical Network (IRON). These are data-only connections and districts connected to the IEN cannot access the public Internet through these connections nor can entities connected to the IEN through peer connections access the IEN provisioned public Internet. The IEN also connects to the Idaho State Network through a data-only peer connection from the Idaho State Network and CenturyLink's MPLS cloud.

Circuit Summaries

- The IEN is connected to 132 District aggregation points, 4 colleges and universities and 2 Microwave distribution points.
- Media provisioned for the 138 IEN connections
 - 20 are Copper
 - 113 are Fiber Optic Cable
 - 5 are Microwave
- Technology utilized for the 138 IEN Connections
 - 79 are Ethernet
 - 59 are MPLS

A conceptual network architecture drawing is provided to aid in visualization of network, though the state may not have a direct, formal relationship with every organization on the diagram.

4. Internal School District Services – School districts are able (but not required) to purchase off of state contracts which include a “public agency” clause. There are a number of current statewide contracts for Metropolitan Area Networks (MAN), VOIP, Security (i.e., firewall, filtering, etc.), network monitoring, video teleconferencing equipment, etc. A listing of the current statewide contracts is available at: http://purchasing.idaho.gov/statewide_contracts.html.

5. Video Teleconferencing Classrooms and Equipment

The OCIO has provided either a fixed configuration receive or origination classroom in each of the high schools connected to the IEN. The IEN Technical Advisory Council (ITAC) has standardized on Cisco (Tandberg) as the preferred manufacturer of hardware-based video teleconferencing units (CODEC). Polycom CODECs have also been deployed in approximately 30 origination classrooms. Additionally, 16 mobile cart video teleconferencing systems have been deployed in elementary schools as part of a pilot project evaluating the effectiveness. All video teleconferencing units have an IEN specific IP address, are monitored and updated through Cisco Video Teleconferencing Management Software and have “Quality of Service (QOS)” activated.

The OCIO also maintains a video bridge and content server to support meetings and special events.

Real time support is provided through a customer assistance center.

6. The OCIO has access to real-time monitoring of

- a. Status of all circuits
- b. Current trouble tickets
- c. Bandwidth utilization
- d. Application utilization

7. All services are E-Rate eligible with the exception of VTC support.

Cisco Response:

[Read and Understand.](#)

Other Design Considerations

While the general purpose of this RFI is to identify potential improvements to the IEN program, ADM and OCIO are interested in hearing opinions for or against current design and implementation decisions. Providers who choose to address these items should express their perspectives in a separate section of their response. Specifically:

Requirement:

- 1. Hardware vs. software/cloud video teleconferencing: The state has implemented a hardware-based video teleconferencing solution with the understanding this solution would provide consistent delivery of a quality experience, especially when used in conjunction with a private managed network.

Cisco Response:

[Read and Understand.](#)

Requirement:

- 2. Fiber Ethernet: The state has emphasized fiber-based Ethernet as the best combination of technology and media for cost and performance.

Cisco Response:

Cost-effective fiber optic media from “last mile locations” to backbone circuits are now more prevalent than before. Fiber offers the best path for scalability, cost, and performance demands now and into the future.

Requirement:

3. Private Managed Network: The state currently operates the IEN as a private, managed network in an effort to optimize performance and costs.

Cisco Response:

Read and understand.

Requirement:

4. Determining bandwidth: The state adjusts established bandwidth based on utilization, believing that method to be more cost effective than a fixed connection standard (e.g. 100Mbs/school or 1Gbs/school).

Cisco Response:

Read and understand.

Requirement:

5. Other: If some other aspect of the current IEN implementation could be improved, please describe the current feature or program element and what should be changed.

Cisco Response:

As rapidly as classroom technology is advancing, end users are demanding an increase in IP-based services which the State should consider as they invest in the IEN.

Legislative Direction

Providers responding to this RFI should be aware of the following general requirements for development, outsourcing and implementation of a statewide network for education, as articulated in Idaho Code 67-5745D/E (please address each section in your response, to the extent possible):

General Requirements

Requirement:

- a. High-bandwidth connectivity, two-way interactive video and internet access, using primarily fiber optic and other high-bandwidth transmission media;

Cisco Response:

Read and understand.

Requirement:

- b. Impacts to economic development with the design and implementation of the educational telecommunications infrastructure;

Cisco Response:

Expanding the State’s ownership of the backbone solution further enhances the opportunity for last mile providers to grow current fiber layouts and build for growth that serves customers beyond the IEN.

Requirement:

- c. Provision of telecommunications needs, other than basic voice communications of public education;

Cisco Response:

Read and understand.

Requirement:

- d. High-quality, cost-effective internet access and appropriate interface equipment to public education facilities;

Cisco Response:

Read and understand.

Requirement:

- e. Implementation of technology and equipment for the delivery of distance learning.

Cisco Response:

The State should consider expanding the service offering to all sites and in the form of various media types to meet the various user needs in education and beyond.

Implementation Requirements

- a. Connecting each public high school with a scalable, high-bandwidth connection, including connections to institutions of higher education as necessary, thereby allowing any location on IEN to share educational resources with any other location;

Requirement:

- i. Take into consideration: Last-mile connections, backbone network, Internet Access, Related Equipment needs, Video Conferencing equipment, Network operations and monitoring, Video operations and monitoring;

Cisco Response:

Read and understand.

Requirement:

- ii. E-rate eligibility is a requirement;

Cisco Response:

Read and understand.

- b. Subsequent Phase Considerations

Requirement:

- i. Connectivity to each elementary and middle school;

Cisco Response:

Read and understand.

Requirement:

- ii. The addition of libraries to the IEN; and

Cisco Response:

Read and understand.

Requirement:

- iii. Provide a discussion as to how your proposed solution for high schools can support each of the potential subsequent phases.

Cisco Response:

Read and understand.

Requirement:

- c. Based on the information provided in this RFI, how would you envision a transition/implementation plan (please include estimated timeframes) to move from the current structure to one that you have outlined in this RFI?

Cisco Response:

Read and understand.

Requirement:

See accompanying spreadsheet – Schools-Libraries Listing.xlsx for a listing of public high schools, institutions of higher education, elementary/middle schools and public libraries. *There are 2 worksheets included in this spreadsheet document:*

- a. **2-13-14 SDE List of Schools** – Alphabetical listing by district of Public High Schools, Colleges and Universities, Public Elementary and Intermediate Schools.

Cisco Response:

No response.

Requirement:

- b. **2015 List of Libraries**– Listing of Idaho Libraries by Library name, includes address, city, zip code, contact information and current connectivity.

Cisco Response:

No response.

Other Response Requirements

Please address how the following requirements, or program elements, could be satisfied for a statewide education network.

Requirement:

- a. What types of collaborative efforts would need to be established with other providers?

Cisco Response:**Overview**

The integrated State backbone can be described as a combination of State-owned equipment strategically located throughout the State interconnected by carrier- provided circuits; or in the case where possible, State-owned fiber. This approach allows the stakeholders of the network to establish Points of Presence (PoPs) locations where services can be aggregated and controlled via agreed- to policies while leveraging carrier circuits and capabilities as well as State-owned assets for inter-PoP communications. In addition, this approach leverages local loop providers for district to backbone connectivity, thus enhancing the ability to establish Gigabit-level services to each school district.

Regional PoP Design

The foundational element of this design and service is based upon the State of Idaho establishing regional PoPs. The benefits of this approach are summarized as follows:

- The regional PoPs will aggregate traffic from the educational entities and other State-related entities utilizing the backbone within a given area or region.
- The regional PoPs will extend the State backbone presence across the entire State, thus providing equal service type and service levels to each region.
- Establishing backbone services in each region allows last mile service providers to be leveraged to facilitate the delivery of gigabit-level service to each school district.
- Applications common to all school districts can be centralized within certain PoP locations, thus leveraging economies of scale. Examples of such applications include, but are not limited to, distribute high-speed Internet service and video infrastructure services such as Multipoint Conference bridging.
- Establishment and monitoring of network performance and policies reflecting agreed-upon system performance and application Service Level Agreements (SLAs).

The PoP locations are very important to the overall capabilities and to achievement of service levels. The fundamental criteria used to select recommended PoP locations referenced within this document are: locations of existing State resources, LATA boundaries, and Service Provider presence. Correlating these items reveals the prime locations that can serve as PoP locations. Suggestions for PoP locations are as follows:

- Coeur D'Alene is a location currently being used by many state entities for disaster recovery facilities. This is ideal as it affords the opportunity to share facility and connectivity investments with districts and other public sector entities. In addition, it has proximity to University of Idaho, thus allowing potential IRON integration.
- Lewiston is an ideal location for proving connectivity to various school district locations across the midsection of Idaho, residing outside of the Verizon LATA.

- Boise/Meridian currently serves as a PoP location for many Service Provider-based services for the entire State. Creation of a PoP in this area will be strategic for service delivery.
- Twin Falls is the largest community within this region of the State and provides the best opportunity for regionalization of backbone services (i.e., last mile service providers, inter-PoP connectivity, and Higher Ed connectivity).
- Pocatello, depending upon the connectivity options within eastern Idaho, this location may act simply as a backbone interconnection site or it could be a standard PoP location, similar to Twin Falls.
- Idaho Falls acts as a central point of communication service delivery for eastern Idaho. It offers the best opportunity for Inter-PoP connectivity and last mile connectivity and connectivity to Higher Ed entities.
- Hailey is the best locations to provide a second east/west PoP, allowing for a ring topology between the west and east sides of the State. These PoP locations are shown in Figure 1.

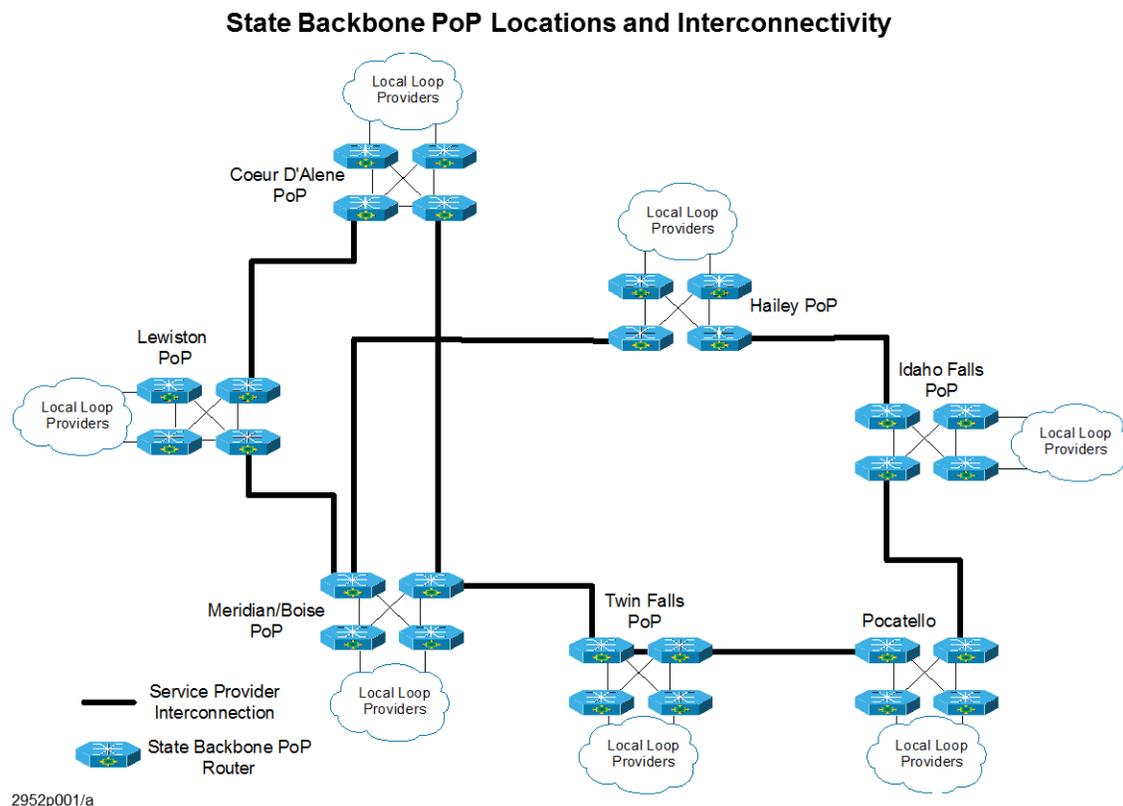


Figure 1. PoP Locations and Interconnectivity

It is recommended that the PoP consist of State-owned equipment sufficient to support the application delivery, security, and growth requirements of its customers. The Metro Ethernet

Forum has established standards for Carrier Ethernet services allowing the seamless delivery of ubiquitous carrier grade, multi-tenant services. The architecture and subsequent equipment selection should support the 2.0 specifications of the Carrier Ethernet standards and deliver the following service-level attributes:

- Network virtualization. The foundation design parameter of this network is to establish a single, converged backbone infrastructure, but present to the customer a completely private network providing any-to-any connectivity within the customer's domain.
- Guaranteed application performance on a per customer basis. Leveraging the virtualized network infrastructure performance characteristics will be defined and enforced through Quality of Service (QoS) parameters and mapped per customer and per application. See QoS recommendations within the performance section for further detail.
- Guaranteed security on a per-customer basis. The nature of the virtual network guarantees traffic separation, per customer. As requirements change over time, additional security mechanisms can be deployed to enhance security levels based upon customer and application requirements.

Last Mile Connectivity

The current bandwidth requirements established by the IEN should serve as the minimum for each school district, with the understanding that the desire is to establish Gigabit Ethernet services as the preferred method of connectivity.

There are last mile providers today that did not exist during the original deployment of IEN several years ago. Many school districts have established high-speed, multi-gigabit networks, interconnecting the various locations throughout the school district. These existing investments and capabilities should be leveraged as the last mile connectivity to the backbone.

Districts that do not have a gigabit service available to provide connectivity to the backbone will continue to leverage the current IEN circuits where possible or establish new connections between the district and the backbone PoP.

Inter-PoP Services

The underlying transport services used to interconnect the PoP locations should be such that State-owned virtualized network service can be easily deployed upon it. Ideally, these circuits would be Ethernet or similar technologies that operate at Layer two of the OSI model. As applications and service demands increase on the network, these services will need to easily support bandwidth requirements ranging from gigabit to 10 gigabit and beyond.

Requirement:

- b. How would connections be made between institutions of higher education to public high schools and eventually to public middle and elementary schools?

Cisco Response:

See response to Requirement a. above.

Requirement:

- c. What would the network architecture management process consist of?

Cisco Response:

Management and Operations

The State should establish a separate organization entity charged with the operations, support, and maintenance of the State backbone. Ideally, candidates would provide, at a minimum, the types of services described in **Table 1**.

Table 1. Operations Summary

<i>Activity</i>	<i>Deliverable</i>
Review networking detailed design	Design report containing recommendations for services-oriented networking architecture and redundancy, resiliency, manageability, and scalability improvements for application and traffic growth.
Analyze performance data and configurations on network devices	Networking performance and optimization report that includes reviewing configurations and providing recommendations based on application characteristics and requirements; assistance with configuration recommendations when new services or protocols are enabled as part of the data center network.
Assess current networking software and hardware levels, including benefits and risks of upgrading software, to develop a software management strategy	Networking software infrastructure analysis report outlining applicable software releases affecting feature and functionality requirements and a proactive software recommendation report that identifies potential benefits and risks of implementing current software upgrades.

- d. What network operations management processes to should be provided? For example:

Requirement:

- i. System performance,

Cisco Response:

This is a combination of technologies deployed to meet the requirements of any and all specific application requirements as the application is consumed.

Packet Loss

- Definition — Packet loss occurs when a large amount of traffic on the network causes dropped packets. This results in dropped conversations, a delay in receiving the voice communication, or extraneous noise on the call.
- Standard — Loss should be no more than 1 percent.
- Bandwidth standards need to be addressed in terms of last mile requirements and inter-PoP requirements.
- Last Mile bandwidth, where possible, will be gigabit or better service. The underlying assumption is that, where possible, the school district will establish new fiber-based Ethernet services or leverage existing investments in fiber-based Ethernet services to provide gigabit connectivity from the school district to the local backbone PoP.
- Inter-PoP bandwidth requirements will need to scale from 10 gigabit Ethernet level of service to 20 and 40 gigabit Ethernet levels of service.

Requirement:

- ii. Reporting,

Cisco Response:

A function of management and operations.

Requirement:

- iii. QoS,

Cisco Response:

Definition - QoS technologies refer to the set of tools and techniques used to manage network resources and are considered the key enabling technology for network convergence. At a high level, QoS defines and enforces the pre-defined Application Service Level Agreements.

RFC 4594 defines 12 classes of media applications that have unique service level requirements. Cisco has defined a set of recommendations based upon RFC 4594 mapping Application Classes to define a set of QoS attributes. **Figure 2** depicts Application Classes as recommended by Cisco. The media applications are defined by the Application Class column followed by the defining QoS attributes. A representative application is provided for each Application Class for reference.

Application Class	Per-Hop Behavior	Admission Control	Queuing & Dropping	Application Examples
VoIP Telephony	EF	Required	Priority Queue (PQ)	Cisco IP Phones (G.711, G.729)
Broadcast Video	CS5	Required	(Optional) PQ	Cisco IP Video Surveillance / Cisco Enterprise TV
Realtime Interactive	CS4	Required	(Optional) PQ	Cisco TelePresence
Multimedia Conferencing	AF4	Required	BW Queue + DSCP WRED	Cisco Unified Personal Communicator, WebEx
Multimedia Streaming	AF3	Recommended	BW Queue + DSCP WRED	Cisco Digital Media System (VoDs)
Network Control	CS6		BW Queue	EIGRP, OSPF, BGP, HSRP, IKE
Call-Signaling	CS3		BW Queue	SCCP, SIP, H.323
Ops / Admin / Mgmt (OAM)	CS2		BW Queue	SNMP, SSH, Syslog
Transactional Data	AF2		BW Queue + DSCP WRED	ERP Apps, CRM Apps, Database Apps
Bulk Data	AF1		BW Queue + DSCP WRED	E-mail, FTP, Backup Apps, Content Distribution
Best Effort	DF		Default Queue + RED	Default Class
Scavenger	CS1		Min BW Queue (Deferential)	YouTube, iTunes, BitTorrent, Xbox Live

2952p002/a

Figure 2. Application Class QoS Recommendation

The 12 application class model represents the sub classification of four general categories, Real Time, Control, Critical Data, and Best Effort. Defining the QoS policy for each application class defines the amount of link bandwidth allocated to each sub class. **Figure 3** represents the percentage of link bandwidth allocated to each application sub class. In addition, the four general categories are represented as well.

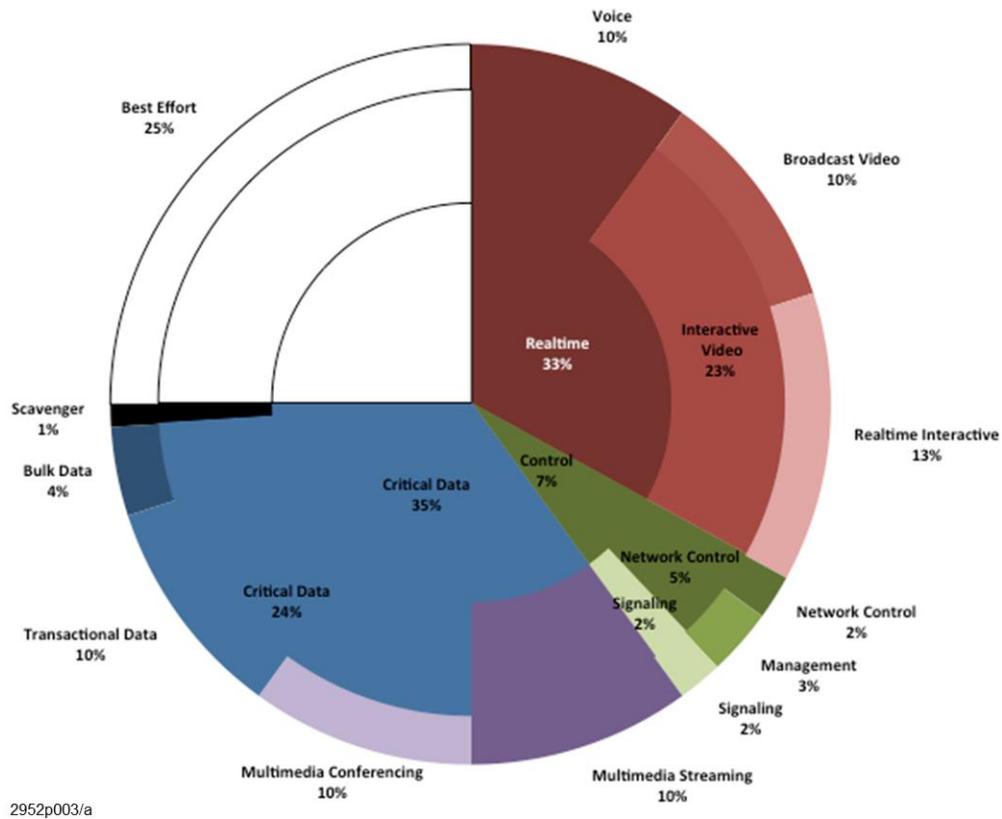


Figure 3. Application Bandwidth Allocation

Depending upon the underlying transport protocol and supporting equipment, a 12-application class model may not be practical. A more typical deployment model maps the standard 12-application class model to a 6-application class model. **Figure 4** represents the recommended application class mapping. Corresponding link bandwidth percentage is also included for comparison.

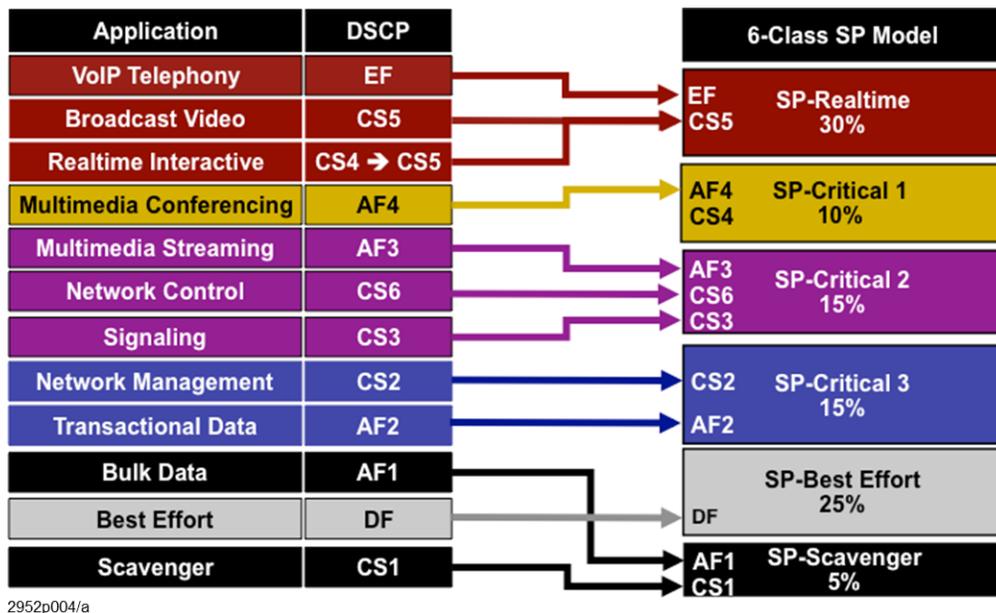


Figure 4. 12-Class to 6-Class Mapping

Requirement:

- iv. Latency,

Cisco Response:

Definition - Latency is the time between the moment a packet is transmitted and the moment it reaches its destination. In converged networks, excessive latency will impact real-time applications such as voice and video.

Industry standards have established a maximum latency value of 150 milliseconds for one-way latency (mouth to ear).

Requirement:

- v. Jitter,

Cisco Response:

Jitter is defined as a variation in the delay of received packets. At the sending side, packets are sent in a continuous stream with the packets spaced evenly apart. Due to network congestion, improper queuing, or configuration errors, this steady stream can become lumpy, or the delay between each packet can vary instead of remaining constant.

Standard - Average one-way jitter should be targeted at less than 30 milliseconds to support applications such as voice and video.

Requirement:

- e. What maintenance windows and notifications for planned and unplanned outages should be specified?

Cisco Response:

Cisco recommends this be decided in cooperation with a third-party network management company. See response to “Requirement C.”

Requirement:

- f. Recommend expected Service Levels.

Cisco Response:

Cisco recommends this be decided in cooperation with a third-party network management company. See response to “Requirement C.”

Requirement:

- g. Recommend Help Desk/Call Center, problem resolution processes, and include escalation processes.

Cisco Response:

Cisco recommends this be decided in cooperation with a third-party network management company. See response to “Requirement C.”

- h. What are your recommended life cycle management, capacity management, and network upgrade parameters?

Requirement:

- i. Include methods for keeping the network infrastructure current with leading technology.

Cisco Response:

Cisco recommends this be decided in cooperation with a third-party network management company. See response to “Requirement C.”

Requirement:

- ii. Include processes and procedures for preventing system obsolescence and providing performance that would meet or exceed service level expectations. Additionally, upgrades should consider the future, long-term network viability.

Cisco Response:

Cisco recommends this be decided in cooperation with a third-party management company. In cooperation with this strategy, the State would be utilizing Cisco Services such as SMARTnet and Optimization Services (NOS). Please also see response to “Requirement C.”

Cisco Services

Today, the network plays a more strategic role in a world that demands better integration between people, information, and ideas. The network works better when services, together with products, create solutions aligned with business needs and opportunities.

Cisco's unique lifecycle approach to services defines the requisite activities at each phase of the network lifecycle to help ensure service excellence. With a collaborative delivery methodology that joins the forces of Cisco, our skilled network of partners, and our customers, we achieve industry-leading results.

Cisco services make networks, applications, and the people who use them work better together.

Cisco service contracts also protect your network investments and provide a variety of additional benefits and features that most warranties do not. Cisco service contracts:

- Provide rapid replacement of hardware
- Enable access to the power of Cisco.com online tools and resources
- Provide software updates
- Help reduce costs associated with network downtime
- Provide annual or multiyear support
- Help reduce operational costs
- Provide access to 24x7 technical assistance
- Provide 24x7 monitoring and incident management.

Requirement:

- i. The state desires a scalable interoperable network. Describe in your response what you believe a scalable interoperable network would look like for a statewide education network.

Cisco Response:

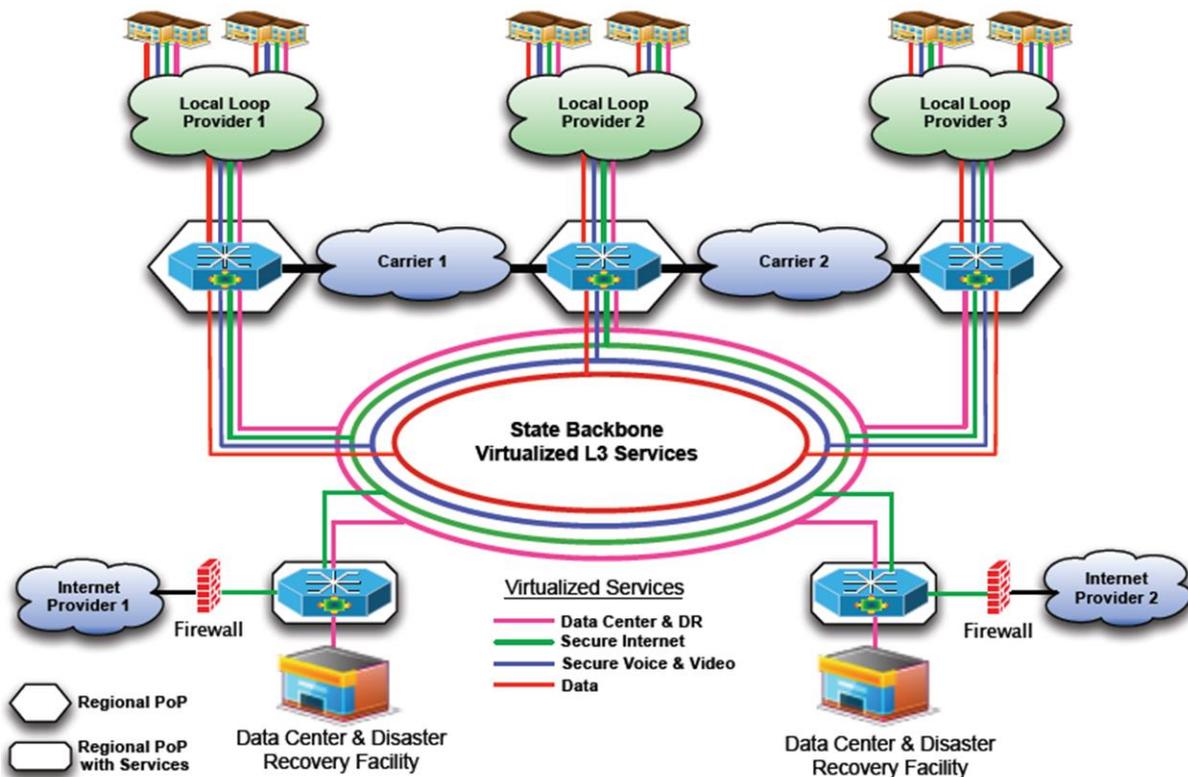
See Figure 1 and associated descriptions.

Requirement:

- j. Recommend Disaster Recovery processes that should be in place.

Cisco Response:

There are DR needs in the State, cities, and counties in Idaho beyond education that should be considered. There have already been a multitude of DR sites brought live by existing State agencies which could be considered shared assets in regards to connectivity. As a result, solutions such as these should be considered as a shared asset to all entities. A strong multi-tenant backbone will allow for these centralized services to be options for education customers as well as others. Furthermore, a multifunction network would allow for enhanced services beyond video. **Figure 5** depicts a converged services network.



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Figure 5. Converged Services Network

Requirement:

- k. What technology standards (i.e., IPv6) should be supported?

Cisco Response:

IPv4 and IPv6

Developing a State-wide network backbone will need to effectively plan and manage the assignment of IP addresses. The State backbone will need to address the evolution of IP-based applications to IPv6. This will become more and more critical as Internet providers, customers, and other State partners begin the migration to IPv6.

For the foreseeable future, networks, especially a State-wide backbone, will need to support both IPv4 and IPv6. For this type of network, the best recommended approach is referred to as dual stack architecture. Dual stack implies that the supporting network devices run IPv4 and IPv6 simultaneously, thus offering a very flexible co-existence strategy. The advantages of such an approach are:

- Complex IPv4 to IPv6 tunneling methodologies can be eliminated or greatly reduced
- IPv4 and IPv6 operate independently, thus allowing flexible integration
- Allows and promotes the gradual migration of endpoints, networks, and applications.

From an administrative perspective, IPv6 is not very different from IPv4. For an organization to connect to the Internet using IPv6 addresses, it must acquire a block of IPv6 addresses from the routable Internet space. Globally unique IPv6 address blocks fall into two categories: Provider Aggregatable/Assigned (PA) or Provider Independent (PI).

PA address space is assigned to a service provider by a regional Internet registry. That service provider will use this block to assign addresses to their customers. PA address space is not portable between service providers. This lack of portability between service providers can lead to issues when a customer is multi-homed to different service providers. PI address space is assigned to an organization by the regional Internet registry. The PI address block assignment model is similar to the way that an organization currently gets IPv4 address space. PI blocks are independent of the service provider that an organization uses for connectivity. If an organization is multi-homed, it should procure PI address space from its regional Internet registry. Different registries have different policies and cost structures relating to PI address space.

Requirement:

- I. What network security levels would you recommend, including the minimum required for E-Rate eligibility?

Cisco Response:

Including network virtualization security needs to be added to the virtualized backbone in accordance to end-user and application requirements. These are design considerations and should be addressed in addition to architecting the backbone.

Requirement:

- m. What Billing processes and methods for dispute resolution would you recommend?

Cisco Response:

No response.

Requirement:

- n. How would you address growth in hard to serve areas?

Cisco Response:

The concept of a few PoP locations accelerates last-mile provider investment throughout the State.

Requirement:

Costs

As the Federal Communications Commission's Universal Service Fund E-Rate program will be a critical component of network funding, respondents are expected to address how the state could best make use of this program to make most effective use of the E-rate program and to include anticipated additional revenue coming into Idaho from the E-rate program.



Cisco Response:

E-Rate can be utilized for funding the K12 element of this broader network. The central governing entity for this shared service network may also consider State budget, federal funding, grant funding, and implementation of a broader and transparent bill-back method for services at the core of the backbone.

Requirement:

Closing

RFI respondents may be invited to present their ideas for improving the design and architecture of the IEN network. Participation is optional, and would be at the expense of the respondent. If any provider feels its response contains confidential information or trade secrets, mark those pages accordingly.

Questions will be accepted until: January 30, 2015

Responses will be received until: February 15, 2015

Please email Brady Kraft at brady.kraft@ien.idaho.gov if you have any questions.

One original and five copies of your RFI response is requested along with a complete electronic copy in MS Word and other MS Productivity products (Excel, Visio, etc...) provided on a CD-ROM or USB drive. Mail your responses to:

Idaho Department of Administration
Attn: Brady Kraft: RFI Response
PO Box 83720
Boise, ID 83720-0304

Cisco Response:

Read and understand.

Attachments

SLED West CENIC Whitepaper



MAC14012 SLED
West CENIC Whitepa

Acronyms

ADM	Idaho Department of Administration
CENIC	California Research and Education Network
CODEC	Coder-Decoder
CTAC	Customer Technical Assistance Center
DR	Disaster Recovery
IoE	Internet of Everything
IP	Internet Protocol
IRON	Idaho Regional Optical Network
ITAC	IEN Technical Advisory Council
MAN	Metropolitan Area Network
MPLS	Multiprotocol Label Switching
NOS	Network Optimization Service
OCIO	Office of the Chief Information Officer
OSI	Open Systems Interconnection Model
PA	Provider Aggregatable/Assigned
PI	Provider Independent
PoP	Point of Presence
QoS	Quality of Service
RFI	Request for Information
SLA	Service Level Agreements
US	United States
USB	Universal Serial Bus
VoIP	Voice over Internet Protocol
VTC	Video Teleconferencing Center