Date: 2/4/2015

Ms. Myla Grasso
Coordinator, Purchasing, Warehouse, and Graphics
Pleasanton Unified School District
4750 First Street
Pleasanton, CA 94566
925.426.4335 (W) 925.462.6065 (FAX)
mgrasso@pleasantonusd.net

Dear Myla Grasso & the evaluation committee,

We are honored to provide our proposal for the RFP #2015-15.04 District-Wide Wireless LAN Rollout.

You may have noticed already that with the amount of detailed information provided to you within this comprehensive proposal, that

a. We are very much interested to be the technology partner for Pleasanton Unified SD,
b. We pay attention to details and the quality of work,
c. We have extensive experience in planning, deploying, and managing infrastructure technologies for k-12 institutions,
d. We have well qualified and trained local staff members that will take pride on what they do,
e. We provide very aggressive pricing while committed to quality and clarity,

For this proposal, we have partnered with the following companies to not only meet but exceed your expectations and requirements;

1. Ruckus Wireless
    a. Providing (896) 3x3:3 Access Points along with Enterprise N+1 Controller and SmartCell Insight application,

2. Brocade Communication systems
    a. Backbone core switching technology that will easily upgrade to 10 Gpbs and 40 Gpbs with minimum upgrade to the optic manuals and cards,
    b. IDF switches that have PoE and PoE+ availability for future explanation and usability without any cost,
    c. Small Smart switch repeaters to be used in Gym area to extent the Cat6 communication links pass the 100 M limitation in order to enable more AP installation for better coverage and quality,
    d. Lifetime warranty on all IDF switches to protect your investment,

3. Panduit & General Cable
    a. The PAN GEN, cabling solution will enable you to enjoy 25 Years Parts and Labor warranty while using the top rated industry connectivity solution.

Project Price

Total Labor / Pro Services	$	278,089.70
Total Products & Material	$	515,425.17
Total Tax	$	46,388.27
WLAN Controller W Lic. cost allocated for this s	$	55,665.12
Project Grand Total	**$**	**895,568.26**

I want to also take an opportunity in this letter and introduce our project administrative and technical team that will be working on your project;

Arman Eghbali, MBA
VP. Engineering Services
AEghbali@itmgmt.com
888-970-2070 Ext.1144

Amir Arazm, CNP
Engineering Services
AArazm@itmgmt.com
408-712 5497

John Recendez
Sr. Technical Consultant
JRecendez@itmgmt.com
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Donald Crozier
Engineering Services
DCrozier@itmgmt.com
408-908-0662

Maryam Mohammadi
Project Management
MMohammadi@itmgmt.com
888-970-2070 Ext.1710

Shahin Jafari
Technical Services
SJafari@itmgmt.com
408-908-0662

Thanya Murguia
Administrative Assistant
TMurguia@itmgmt.com
888-970-2070 Ext. 1730

Mathew Nikad, CCNP
Engineering Services
MNikad@itmgmt.com
888-970-2070 Ext. 1288

IT Management Corporation has been serving the technology needs of private businesses and public sector organizations since 2009. We specialize in providing network assessment, planning and design, implementation, project management, documentation, voice and data consulting and convergence, training and technical services for new projects and existing systems.

Our project history in K-12 education is the following:

South San Francisco Unified School District
Project Scope: Upgrade network infrastructure district wide from 1Gig to 10Gig single mode fiber for MDF-IDF, 200 network switches, UPS back up units for MDF-IDF. (Awarded 7 phase project currently active)

Franklin McKinley School District
Project Scope: Upgrade 200 network switches to 10Gig district wide, 10 gig fiber patching, UPS back unit for MDF-IDF, Cat6 cabling, design and implementation of network wireless infrastructure.

Mount Pleasant Elementary School District
Project Scope: Upgrade 60 network switches district wide, design, and configuration.

Cupertino Union School District
Project Scope: Upgraded 900 network switches to 10Gig district wide, Design and Implementation, UPS back unit for MDF-IDF, 600 wireless access point deployment.

The IT Management team is dedicated to provide service excellence in design, implementation and project management.

Sincerely,

Arman Eghbali MS, MBA
VP. Engineering Services
888-970-2070 Ext. 1720
888-506-0606 Fax
SLED@ITMGMT.com
www.IT-Management.com

Pleasanton Unified School District
Request for Proposals # 2014-15.04
District-Wide Wireless LAN Rollout

Bid Opening Thursday, February 5, 2015 10 a.m.

PUSD Purchasing Office
4750 1st Street
Pleasanton, CA 94566

NOTICE TO BIDDERS

Notice is hereby given that the Board of Trustees of the Pleasanton Unified School District, County of Alameda, State of California, will receive sealed bids for the following:

RFP NO. 2014-15.03 – WIRELESS LAN ROLLOUT
Opening Date: Thursday, February 5, 2015, 10 a.m.

BID OPENING DATE AND TIME: Responses will be opened and read publicly on Thursday, February 5, 2015, at 10 a.m., at the Pleasanton Unified School District Purchasing Office. Responses must be **sealed** and filed at Pleasanton Unified School District, Purchasing Office, 4750 1st Street, Pleasanton CA 94566 before the time fixed for opening proposals for this bid.

DISTRICT PROPOSAL FORM MUST BE USED: All bids must be submitted on the Proposal Forms obtainable on the District website at http://go.pleasantonusd.net/bids, at the Purchasing Office set forth above, via email request to purchasing@pleasantonusd.net , or phone call to 925.426.4335. Each bid must be in accordance with the specifications in the bid documents. All sealed envelopes must be clearly marked "BID NO. 2014-15.04."

LETTER OF INTENT: Proposers must submit a letter of intent to submit a proposal no later than Monday, January 5, 2015. Letters should be emailed to Myla Grasso, PUSD Purchasing Coordinator, at purchasing@pleasantonusd.net .

MANDATORY JOB WALK: Mandatory job walks are scheduled for Tuesday, January 6, and Wednesday, January 7, starting at 8:30 a.m. Proposers must attend both days.

INTERVIEWS: Interviews, if required, will be scheduled on February 10, 2015

BID WITHDRAWAL LIMITATION: No bidder may withdraw his bid for a period of 120 days after the date set for the opening thereof.

RIGHTS RESERVED TO THE DISTRICT: The Board of Trustees reserves the right to be the sole judge of the responsibility of any responder and of the suitability of the equipment, supplies, and/or services offered.

Myla Y. Grasso
Purchasing Coordinator
Pleasanton Unified School District

Request for Proposal #2014-15.04 Pleasanton Unified School District District-Wide Wireless LAN Rollout

Response Due: Thursday, February 5, 2015, 10 a.m.

Purpose and Scope. The purpose of this Request for Proposal (RFP) is to solicit proposals from vendors for the purchase and installation of a high-density, wireless LAN infrastructure for sixteen (16) sites and facilities in the Pleasanton Unified School

District (the "District"), including the District headquarters, pursuant to Public Contract Code section 20118.2. General information about the District can be found at http://www.pleasantonusd.net.

The District is seeking to implement extended, secure coverage to all points within school district buildings. The acquisition will include AP's/controllers, centralized management, PoE/PoE+ IDF switches, new core MDF L2/3 switches, cabling, and any other equipment deemed necessary for the complete installation of a wireless network. Other requirements include:

1. A system supported by a highly qualified and reliable vendor with experience in complex cabling implementations.
2. Mainstream products with strong manufacturer commitment and vendor support.
3. Industry standards-based – 802.11a/n/ac and 802.11b/g/n
4. Easy to install/upgrade to newer standards as they become widely accepted and available.
5. Easily maintained by network administrators through a centralized management system/software.

It is the sole responsibility of the proposer to monitor the District Purchasing website (http://go.pleasantonusd.net/bids) for any addenda to the RFP. For the purpose of this document, the terms proposer, responder, vendor, supplier and contractor are those entities submitting a response to this RFP.

SECTION 1: GENERAL REQUIREMENTS

1.1 **Proposal Validity Period**. Submission of the proposal will signify the vendor's agreement that their proposal and the content thereof are valid for 120 days following the submission deadline and will become part of the contract that is negotiated between the District and the successful vendor.

1.2 **Evaluation Process**. The evaluators will consider how well the vendor's proposed solution meets the needs of the District as described in the vendor's response. It is important that the responses be clear, concise and complete so that the evaluators can understand all aspects of the proposal. The evaluation process is not designed to simply award the contract solely based on the lowest bid. Rather, it is intended to help the District select the right vendor with the best combination of professional attributes, experience, relevant skill-sets, and cost, based on the evaluation factors.

The District reserves the right to require that a subset of finalists make a presentation to the evaluation team for consideration. This RFP provides general and technical information as well as the required format for responses. Your submitted responses will be the primary source of information used for the system evaluation and selection.

Please include all required and appropriate information with your proposal. No other source of information, written or verbal, will be considered part of your proposal. At the completion of the RFP process, the District will determine the viability of moving forward to complete negotiations with the chosen vendor to provide equipment services and solutions that best meet the needs of the District's criteria for design, cost, vendor requirements and references.

All Responders must meet the following criteria:

1. Responder must be currently licensed to do business in the State of California, which will be validated by Responder providing copies of all licenses and/or certificates as part of Responder's proposal.
2. Responder must have been in existence at least three (3) years as an operating business.
3. Responder must not have declared any form of Bankruptcy in the last five (5) years.
4. Responder must provide a list of at least three (3) clients where Responder has completed a contract of comparable size and scope of services.
5. Responder shall have the ability to fulfill standard contract requirements, including indemnification and insurance of the District, if necessary.
6. Responder must be currently eligible as a provider of services under the E-Rate guidelines and provide their E-Rate Service Provider Identification Number (SPIN).
7. Responder shall meet other presentation and participation requirements listed in this RFP.

1.3 **Schedule**. Hard copy responses and related material must be delivered by Thursday, February 5, 2015, at 10 a.m. as specified in Sections 1.14 and 1.15. Late responses will not be considered and will be returned unopened An approximate schedule is as follows:

Activity	Time	Date

RFP released		December 12, 2014
Vendor Notice of Intent to Propose	4 p.m.	January 5, 2015
Mandatory Job Walk	Starting at 8:30 a.m. each day	January 6 and 7, 2015
Deadline for Questions	4 p.m.	January 21, 2015
Proposal Due Date	10 a.m.	February 5, 2015
Interviews (as requested)		February 10, 2015
Contract Award		February 24, 2015

1.4 **Notice of Intent to Propose**. Vendors submitting proposals are required to submit a Letter of Intent no later than January 5, 2015, via e-mail, to: Myla Grasso (purchasing@pleasantonusd.net). The letter must be submitted on the vendor's letterhead.

Please identify the name, address, phone number, fax number, and e-mail address of the person who will serve as the key contact for all correspondence regarding this RFP. Submission of the Letter of Intent constitutes the vendor's acceptance of the procedures, evaluation criteria, and all administrative instructions of this RFP. Letters may be withdrawn at any time before the deadline for submission. A list of all vendors submitting a letter of intent will be available upon request.

1.5 **Deadline for Questions**. Questions regarding the RFP should be asked in writing after the facility tour. Responses will be posted on the District website and e-mailed or faxed to all proposing vendors. In order to make information available to all proposing vendors, no questions will be answered if submitted after 4 p.m. on January 21, 2015.

1.6 **RFP Submission**. Please submit four (4) hard copies of the proposal and one electronic copy (on USB Drive or CD/DVD), in its entirety, to the contact and address stated in 1.7 by 10 a.m. on Thursday, February 5, 2015.

1.7 **Vendor Communication**. Upon release of this RFP, all vendor communications concerning the overall RFP should be directed to the Purchasing Coordinator listed below. Unauthorized contact with District employees regarding this RFP is not permitted. Any oral communications will be considered unofficial and non-binding to the District. Vendors should rely only on written, faxed, or e-mailed statements issued by:

Ms. Myla Grasso
Coordinator, Purchasing, Warehouse, and Graphics
Pleasanton Unified School District
4750 First Street
Pleasanton, CA 94566

925.426.4335 (W)
925.462.6065 (FAX)
mgrasso@pleasantonusd.net

1.8 **Right of Selection/Rejection - Waiver of Informalities or Irregularities**. The District reserves the right to reject any or all proposals, to waive any minor informalities or irregularities contained in any proposal, and to accept any proposal deemed to be in the best interest of the District. Selection of a vendor shall not be construed as an award of contract but as a commencement of contract negotiations, including but not limited to the proposed contract price.

1.9 **RFP Revisions**. The District reserves the right to change the schedule or issue addenda to the RFP at any time up until the submission deadline. The District also reserves the right to cancel or reissue the RFP at any time. Addenda or a notice of cancellation will be posted to the District's website. It is the sole responsibility of the proposer to monitor the District's website for the posting of such information.

1.10 **Compensation**. No payment of any kind will be provided to the submitting vendor, or parties they represent, for obtaining any of the information solicited. Procurement of all equipment and services will be in accordance with any subsequent written contract.

1.11 **Commitments**. All quotes should be submitted on the most complete basis and with the most favorable financial terms available. The selected proposal may, at the District's option, be made part of the final purchase contract, and all representations in the proposal may be considered commitments to supply the system as described.

1.12 **Contract Award and Execution**. The District reserves the right to make an award without further discussion of the proposal submitted. Therefore, the proposal should be initially submitted on the most favorable terms the vendors can offer. It is understood that the proposal will become a part of the official file on this matter without obligation to the District. The general conditions and specifications of the RFP and the successful vendor's response, as amended by agreements between the District and the vendor, will become part of the contract documents. Additionally, the District will verify vendor representations that appear in the proposal. Failure of the vendor's products to meet the mandatory specifications may result in elimination of the vendor from competition or in contract cancellation or termination. The successful vendor is expected to enter into a contract with the District on terms similar to those set out in this RFP. If the selected vendor fails to sign and return the final contract within ten (10) business days of delivery, the District may elect to cancel the contract and award it to the next highest-ranked vendor.

No cost to the District may be incurred before the vendor has returned a fully executed contract.

1.13 **Late Submissions**. Proposals received after the due date, and time, will not be accepted. The District is not responsible for late delivery or proposals lost in transport. Please refer to the RFP schedule for the due date.

1.14 **Proposal Preparation**. All proposals must be received by 10 a.m. on Thursday, February 5, 2015. Proposals are limited to 8 -1/2 x 11 paper in appropriately sized three ring binders or portfolios, with index tabs to separate sections. One electronic copy on USB drive or CD/DVD must be included in the sealed envelope. Email or Faxed proposals will not be accepted. The District is not responsible for any costs incurred by the responder in the preparation of the proposal.

Proposals must be organized as follows:

1. Cover letter – must include firm name, address, telephone, fax, and email address.
2. Company information (page 22).
3. List of similar projects and references (page 24).
4. Answers to Specific Questions posed in this RFP (Section 2).
5. Proposed design solution including a list of the specific equipment, and any site maps and data cabling needed to provide a complete Wireless Infrastructure system meeting the requirements identified in Section 2.
6. Detailed cost proposal, broken down by school/district office.
7. Project management plan including a proposed system design and installation schedule. The District's intent is to have all networks installed, tested and functional before the first day of school, August 11, 2015.
8. Identify all warranties and guarantees.
9. Non Collusion Declaration (page 24).
10. Page 10 showing agreement to piggyback clause.

1.15 **Number of Proposals**. Responders shall provide four (4) hard copies of their proposal and one electronic copy on USB drive or CD/DVD in a sealed envelope. Each envelope must be clearly marked with "RFP 20104-15.04". If printed supplementary materials are included which are not 8.5 x 11, four (4) copies should be included.

1.16 **Screening of Proposals**. The District will screen all proposals and may reject any proposal that does not meet the minimum requirements. The District reserves the right to reject any and all proposals. The District shall evaluate the proposal using the following criteria, which are also given relative weighting:

1. Initial Price: 25%
2. Performance and performance reliability: 25%
3. Ease of management, modification and updating: 20%
4. Life Cycle costs: 10%
5. Delivery timetables: 5%
6. Support logistics: 10%
7. Warranty: 5%

1.17 **RFP Addenda**. The District reserves the right to amend this RFP at any time prior to the closing date. It is the responder's responsibility to check the District website at http://go.pleasantonusd.net/bids for any addenda prior to submitting their response.

1.18 **Ownership of Materials**. All materials submitted in response to this RFP become the property of the District. Proposals and supporting materials will not be returned to Responders.

1.19 **Confidential or Proprietary Information**. The District is not obligated to maintain the confidentiality of any information that was known prior to receipt of a proposal, or becomes publicly known through no fault of the District, or is received without obligation of confidentiality from a third party. District documents are subject to the California Public Records Act, (Gov. Code § 6250, et seq.). If a Public Records Act request is made to view confidential information in a proposal, the District shall notify the responder of the request and the date that such records will be released to the requester.

1.20 **Complete Solutions**. The District will accept only complete solutions from a prime supplier. Responders may not bid on only one item or selected items from the RFP.

1.21 **Supplier Presentations**. After an initial District screening and reduction of proposals, remaining Responders may be required to give an oral presentation of their proposal to the Selection Committee to further define the primary features and benefits of their proposal, to allow clarification of their proposal and to permit questions from the committee. These presentations will be scheduled on Tuesday, February 10, 2015.

1.22 **Award Notification**. The District will make selection after proposal review, possible interviews, and references checks. After a final selection is made, the selected supplier will be invited to negotiate a contract with the District. The selection and contract is tentatively scheduled to be presented to the PUSD Board of Trustees for

approval at their meeting on February 24, 2015. Remaining Responders will be notified in writing of their selection status on or after February 19, 2015.

1.23 **No Press Releases or Public Disclosure**. The selected vendor may not release any information about this RFP. The selected supplier may not issue a press release until after Board approval and under contract with the District.

1.24 **Contract Award**. The contract will consist of this RFP, the proposal, District standard terms and conditions, and all addenda, along with all other written correspondence concerning this RFP.

1.25 **Primary Supplier**. The District expects to negotiate and contract with only one prime supplier. The District will not accept any proposals that reflect an equal teaming arrangement or from Responders who are co-bidding on this RFP. The District will not accept any invoices from subcontractors or become part of any negotiations between a prime supplier and a subcontractor.

Software upgrades, fixes, or any other enhancements to the solution shall be made available to the District under the same conditions as the original proposal, up to and including the implementation date.

1.26 **Offer Expiration Date**. Proposals in response to this RFP will be valid for 120 days from the proposal due date. The District reserves the right to ask for an extension of time if needed.

1.27 **Designation of Requirements**. The District fully expects responders to provide a comprehensive solution on a level that meets or exceeds all requirements as stated in the RFP. To prevent any confusion about identifying requirements in this RFP, the following definition is offered: The words shall or must are used to designate a "high priority requirement". Responders must respond to all high priority requirement presented in this RFP. Failure to respond to all high priority requirements may be cause to disqualify a proposal.

1.28 **Product Use Requirements**. The District requires that hardware included in proposals be currently in use in a production environment by at least three (3) other public school districts in California and/or other states and have been in use for at least six months. Unreleased or beta test hardware, systems software, or application software will not be accepted. It is understood that applications and software required to be developed is excluded from this provision.

1.29 **Proposal Errors**. The District will not be liable for any errors or omissions in proposals.

1.30 **Alternate Proposal and Options**. Responders may propose enhancements or equipment that provides increased performance as an option to the baseline RFP. Any option proposed must be clearly itemized as an option with the appropriate cost increase (or decrease) and contain a brief description of the enhancement.

1.31 **Pricing**. Responders shall provide the District with firm, fixed prices for the equipment at all sites specified in this RFP.

1.32 **E-Rate.** All pricing as proposed in Bidder's/Responder's solution must conform to E-Rate rules and regulations, as well as FCC mandates, as it applies to Lowest Corresponding Price, and must be proposed as a separate contract price, independent of the District's ability to use any 'master contract' or 'piggy- back contract' pricing element.

1.33 **Piggyback Clause**. For the term of any Agreement reached between the District and the selected Vendor, and any extension thereof, and at the option of the vendor, other school districts and community college districts, any public corporation or agency, including any county, city, town or other public corporation within the State of California, may purchase, lease-purchase, or otherwise acquire the identical item(s) at the same price and upon the same terms and conditions, pursuant to Public Contract Code section 20118 (K-12) and 20652 (Community Colleges) of the Public Contract Code. The Pleasanton Unified School District waives its right to having such other Districts draw their warrants in favor of this district as provided in said code section.

_____ Initial to indicate acceptance of Section 1.33 and return with bid submission.

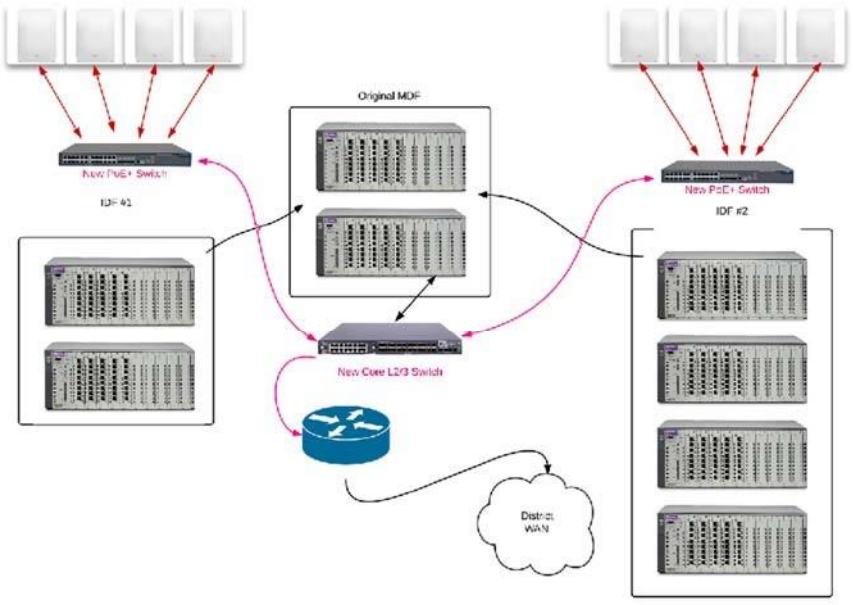
SECTION 2: TECHNICAL REQUIREMENTS

<u>Introductory Note</u>: The District is encouraging the broadest possible response to its need for a robust, comprehensive and adaptable Wireless System. If the products and systems you propose render one or more of the following questions or specifications inapplicable, please so indicate in your response.

2.1 **Architecture Overview and System Technology**. The following section requests information concerning general characteristics about proposed equipment for an 802.11a/n/ac and 802.11b/g/n network. The equipment selected must be able to

support an initial 802.11a/n/ac and 802.11b/g/n deployment and also have the flexibility for a future upgrade to support new standards. Please provide the requested information in the following table. All answers must relate to equipment/features the vendor is currently proposing. Do not indicate features from future products.

The District's existing switching infrastructure is insufficient to support the robust Wireless LAN envisioned in this RFP. Accordingly, the successful respondent will need to include a new switched network relying on existing dark fiber between MDF and IDF closets to connect the new Access Points. In addition, the design must include a new core Layer2/3 switch to aggregate these new switches as well as provide a port to connect the existing wired network. It is intended that the existing wired network connect to the new core switch and be isolated in its own VLAN separate from the new wireless network. Current campus networks are not segmented into VLANs. A sample of the proposed design appears below:



The District expects the following guidelines to be incorporated in each vendor's proposal:

- Classrooms: 2 radios
- Multi-Purpose Rooms: 6 radios

- Gymnasiums (Middle and High schools): 6 radios
- Library:
    - Elementary: 4 radios
    - Middle and High: 6 radios
- Administrative Offices: 2 radios per counted location
- Conference/Meeting Rooms: 2 radios

Here is a breakdown on quantities to be bid for each campus:

School/Site	Classrooms	Multi-Purpose Rooms (6 radios each)	Gymnasiums (6 radios each)	Library	Administrative Offices (2 radios per count)	Conference/ Meeting Room
Alisal	31	1		1	2	1
Donlon	37	1		1	2	1
Fairlands	31	1		1	2	1
Hearst	33	1		1	2	1
Lydiksen	36	1		1	2	1
Mohr	32	1		1	2	1
Valley View	32	1		1	2	1
Vintage Hills	32	1		1	2	1
Walnut Grove	37	1		1	2	1
Hart Middle	52	1	1	1	3	1
Harvest Park Middle	45	1	1	1	3	1
Pleasanton Middle	56	1	1	1	3	1
Amador Valley High	114	1	2	1	4	2

Foothill High	121	1	2	1	4	2
Village High	16	1			2	2
District Office Complex		1			32	5

In order to maintain consistency among vendors please, use the following definition for Access Point (AP): Access Points (APs) are self-contained independent nodes of a wireless local area network (WLAN) that contain one or more radios and directly bridge 802.11 packets to 802.3 packets.

Questions to be addressed in your response:

1. List the make and model number of the proposed Access Points or controllers (if required)
   a. Proposed AP Make(s) and Model(s):
   Zone Flex R600, ZF R700
   b. Proposed Central Management Software Application Model
   Smart Zone 100
2. Are all components of the proposed system Wi-Fi Certified? For which protocols?
   Ruckus Wireless products are 802.11a/b/g/n/ac based and certified by the Wi-Fi Alliance, WEEE/RoHS compliance, EN 60601-1-2 (Medical), UL 2043 plenum rated
3. Does the proposed AP have an embedded/integrated controller or is an external controller/wireless switch required for operation? If external controller is required, what is the maximum encryption (WPA2) supported and how will this impact the number of APs controlled?
   External Controller. WPA2-Enterprise AES
4. How many 802.11a/n/ac radios are supported in the Access Point?
   One
5. How many 802.11b/g/n radios are supported in the Access Point?
   One
6. Can 802.11a/n/ac and 802.11b/g/n be supported simultaneously from the same Access Point Model specified above?
   Yes
7. Can the Access Point support 802.11g-only mode?
   Yes
8. Can the Access Point support 802.11n-only mode? For 2.4 GHz or 5 GHz?
   Yes

9. Can the Access Point support 802.11ac-only mode?

Yes

10. Can the radios inside the Access Point be removed and replaced without replacing the entire Access Point?

No

11. Can an individual radio function on both the 2.4Ghz and 5Ghz bands?

Yes

12. How many radio interfaces does each Access Point support?

Two

13. Can the radios and antennas inside the Access Point be upgraded to support 802.11ac Phase 2 without replacing the Access Point?

No

14. What options are available to configure Access Points? (Serial connection, SSH, HTTPS, Web, wireless, etc.)

HTTP/S, Telnet, SSH, SNMP v1, SNMP v2, SNMP v3. Also Zone Director can push configurations

15. Will Access Points continue to provide full functionality if local or remote management systems become unavailable?

Yes only if not using radius authentication. All current connections will stay connected, new connections will not be able to authenticate

16. How many Gigabit Ethernet ports does the Access Point have?

Two

17. Describe the automatic RF tuning capabilities of each access point.

Ruckus has a technology called BeamFlex. Combining a compact internal antenna array with expert control software, BeamFlex continuously ranks the antenna configurations for each receiving device and reconfigures itself in real-time to optimize throughput mitigating the effect of interference and physical clutter.

18. Are each radio's RF settings manually configurable?

Yes

19. Are the RF patterns manually and automatically configurable without replacing antennas to allow for varying shaped buildings (squares, rectangles, etc.).

Automatically, RF patterns are managed by BeamFlex

20. Does the proposed Access Point have external antenna connectors?

No

21. Are your products WiFi 802.11x certified?

Yes

22. Are the Access Points capable of operating in the 4.9GHz public safety band?

Yes, they are cable of using UNII-2 DFS, in addition to UNII-1 and UNII-2. Our controller software also allows for Radar avoidance pre-scanning.

23. Are the Access Points capable of using the UNII-2 DFS channels on 5Ghz?

Yes

24. Does each Access Point require a separate IP Address?

Yes

25. Does each Access Point have upgradeable system memory? Upgradeable packet memory? Upgradeable Flash memory?

No

26. Does each Access Point have an upgradeable onboard AES encryption engine?

No

27. Does the Access Point have LEDs that indicate status, traffic activity, etc.?

Status only

28. Does each Access Point have a software upgradeable QoS and packet processing engine for queuing and traffic control?

No

29. Will the Access Point function with PoE (802.3af) power available? If it will not operate fully with PoE (802.3af), describe which features are not available.

Fully 802.3af compliant. Peak power usage is 12.95W

30. Provide a system overview for your 802.11x products.

See Datasheets in section 4

31. Describe your antenna configuration on your proposed APs.

Ruckus has BeamFlex adaptive antennas with over 1000 unique antenna patterns in each 2.4Ghz and 5Ghz bands

32. Please indicate where 802.11n AES encryption/decryption takes place. At the AP or the central management console?

Over the air link layer encryption is handled at the AP.

33. Does the system provide integrated troubleshooting tools?

Yes

34. List other Standards/Protocols that are supported.

WEEE/RoHS compliance, EN 60601-1-2 (Medical), UL 2043 plenum rated

35. What are the unique features your product offers that may not have been covered?

Integrated within Ruckus Smart Wi-Fi systems, these technologies ensure reliable and predictable performance, essential for supporting the most challenging applications.

BeamFlex is the industry's most advanced Wi-Fi smart antenna implementation. Combining a compact internal antenna array with expert control software, BeamFlex continuously ranks the antenna configurations for each receiving device and reconfigures itself in real-time to optimise throughput mitigating the effect of interference and physical clutter.
ChannelFly is a dynamic self-optimising channel selection algorithm that uses live channel activity to measure and rank channel capacity based on measured throughput to client devices. ChannelFly improves throughput to client devices in noisy environments providing up to 60% increased capacity over classic channel selection techniques.
SmartCast is an advanced traffic management engine providing myriad unique functions such as content parsing, multicast conversion, application classification, and quality of service controls. Unlike other quality of service implementations, SmartCast provides automatic flow classification, software pre-queuing per station, and per-packet scheduling of traffic over the antenna array.
SmartSec a unique collection of advanced security capabilities enables dynamic generation of pre-shared encryption keys, role-based user access, Layer 2/3 client isolation, robust link layer encryption, and wireless intrusion detection and prevention
SmartMesh Mesh networking changes the fundamental economics of WLAN deployment. SmartMesh Networking uses Ruckus-patented Smart Wi-Fi and expert RF routing technologies to create long-range, reliable and adaptive Wi-Fi trunk connections between mesh APs, obviating the need for cabling Ethernet to every AP.

36. How scalable are your controllers and APs?
    The R600 and R700 can handle 500 concurrent sessions.
    The SZ100 supports up to 60,000 clients and 2048 WLANs per device, and manages up to 1000 ZoneFlex Smart Wi-Fi access points.
37. How does your design mitigate the issues of co-channel interference?
    Ruckus uses ChannelFly.

2.2 **Wireless Networking.** The following section requests information concerning the general characteristics of the proposed specified equipment. The need to support 802.11ac is required and must be considered for all equipment selection. Please provide the following information. All answers must relate to equipment features the vendor is currently proposing. Do not indicate features of future products.

Questions to be addressed in your response:

1. Does the system support multiple SSIDs?
   32 SSIDs for 2.4Ghz range
   8 SSIDs for 5Ghz range

2. Is the system capable of broadcasting at least 8 SSIDs per radio?

Yes

3. Is the system capable of mixing broadcast and non-broadcast SSIDs on the same Access point?

Yes

4. Does the system allow wireless QoS settings per SSID, Per User, and per application?

Yes

5. Does the system support creation of User Groups to associate collective access rights to a set of users?

Yes, using Zone Director

6. Does the system support 802.11e in the Access Point?

Ruckus uses SmartCast QoS, which allows 4 high and 4 low priority queues per client device. Instead of 4 to 8 shared across the AP. It is specifically optimized for video, voice, and data.

7. Can the system perform VLAN tagging on a per SSID basis at the Access Point?

Yes

8. Does the Access Point support seamless roaming between radios?

Yes

9. Does the Access Point support 802.11i PMK caching between Access Points?

Yes

10. Does enabling of roaming require configuration changes on any equipment not supplied by the vendor including network switches, routers, computers, etc.?

No

11. ls additional software required to take advantage of certain features on our or visitors' computers? Explain the additional functionality of the software.

No, the AP's have guest functionality built in

12. Does roaming require the use of Mobile IP protocols?

Ruckus offers Vlan pooling if user roam between vlans. Ruckus also offers opportunistic key caching across AP's where 802.1x is deployed to support roaming.

13. Can traffic be limited on a per station basis?

Yes, traffic can be limited on a per station basis. Bandwidth rate limiting controls per station can be different for each SSID. Ruckus offers traffic control in both uplink and downlink directions independently. Furthermore, traffic can be controlled per device based on the device type. For example you could limit bandwidth for gaming devices.

14. Can traffic be limited on a per SSID basis?

Yes

15. Does the Access Point support automatic RF configuration?

Yes

16. Does the Access Point support automatic and dynamic cell sizing?

Yes, the AP supports dynamic cell sizing. In addition granular power adjustments can be optimized per band, and specific data rates/bss rates can be modified per SSID.

17. Is the AP/system capable of fully automatic compensation for an AP that is not available due to loss of power or failure?

Yes

18. How does the system provide role-based policy control? For example, how can a student and a teacher in the same SSID and same VLAN have different access rights, QoS, and/or rate-limits?

The system can tag users based on Active Directory or RADIUS.

19. What Broadcast/Multicast control functionality is offered to prevent broadcast storms from taking down the WLAN?

Ruckus offers a range of access control mechanisms to block layer2 multicast traffic. With Ruckus you have the ability to isolate traffic per connected device across the AP and across the entire network. The AP can block all mDNS traffic, or specific types of mDNS traffic. The AP can also force DHCP to protect from IPv6 Arp storms. Furthermore, the AP can act as a proxy ARP. Ruckus has an onboard mDNS(Bonjour/Chromcast Gateway) in each AP and controller to provide control over multicast traffic including bridging of traffic and fencing mechanisms to control the spread of broadcast traffic.

20. How does the system ensure stations are connected to an optimal AP?

Ruckus provides several mechanisms to ensure stations are connected to the optimal AP. These include 802.11r for fast bss-transistion, 802.11k for providing neighbor report to connected clients. Also, Ruckus offers a feature called smart roam which steers connected clients to most optimal AP. Ruckus also offers client and band load balancing that is configurable. You can set thresholds on user counts per radio, per AP, and per SSID to force load balancing. Furthermore, Ruckus offers tunable load balancing across AP's using dbm measurements on both 2.4ghz and 5ghz bands. Lastly, Ruckus AP's offer %percentage based band balancing to move clients from 2.4ghz to 5ghz based on load conditions. Ruckus also supports adjusting bss minimum supported rates to adjust the usable cell size within the physical cell size to improve client performance, minimize channel overhead caused by beacons, and probe responses.

2.3 **Wired Networking.** The following section requests information concerning the wired networking characteristics of the proposed equipment.

Questions to be addressed in your response:

1. Does the Access Point support a redundant Gigabit uplink port to the wired network?
   No
2. Does the Access Point support DHCP relay?
   No, DHCP relay is supported at the switch
3. Does the system support 802.1p and 802.1Q tagging at the Access Point?
   Yes, from the switch perspective, the switch supports 802.1Q and 802.1p.
4. Does the system allow wired QoS settings per SSID, per user, and per application?
   Yes, from the switch perspective, the switch will honor 802.1p or DSCP QOS setting from the AP
5. Can a VLAN be assigned an IP Address?
   Yes, a single IP address or range of IP addresses can be assigned to a VLAN
6. Can the system perform VLAN tagging on a per SSID basis at the Access Point?
   Yes, each SSID can be considered a different VLAN ID
7. Can traffic be limited on a per station basis?
   Yes an ACL can be applied to the station based on the MAC address or IP Address
8. Can the system function without any of the above services enabled?
   Yes, Many policy settings and QoS settings are available in the default configuration of the wired switches. If a configuration fails the wired switch network equipment will continue to pass data
9. List the make and model number of the proposed MDF and IDF switches.
   MDF – Brocade ICX7750 and ICX7450
   IDF – Brocade ICX7450
10. While the current fiber backbone will be limited to 1G, does the proposed MDF switch support 1G, 10G and 40G links? In what quantities of each type?
    The proposed wired equipment will support uplinks of 1G in the IDF switches and the core switches can support 1G and 10G uplinks.
    Capacities per device:
    ICX6430 – Comes standard with 4 ports of 1G SFP for uplink capacity.
    ICX7450 – Comes standard with 3 module slots that support 4x1G, 4x10G or 1x40G modules for uplink capacity.

11. What options are available to configure the switches? (Serial connection, SSH, HTTPS, Web, etc.)

All the above are supported. In addition Brocade switches can be configured through ZTP (Zero Touch Provisioning) which enables switches to be remotely deployed through download of its configuration and settings from a FTP server. There is also an option for a central management system to holistically manage and maintain the entire infrastructure.

12. Do the proposed MDF and IDF switches use the same management interfaces?

All Brocade ICX switches in the MDF and IDF run the same management interface.

13. Do the IDF switches support PoE and PoE+? How many ports are supported with each power setting?

The IDF switches support PoE and PoE+. With a single 1000w power supply the ICX 7450-24P will support all (24) tx ports at PoE or (12) ports of PoE+ and the remaining (12) ports at PoE. If the 2nd 1000w power supply is added then the ICX7450 will support a full load of (24) ports of PoE or (24) ports of PoE+.

In addition, the first (8) ports of the ICX7450 support PoH, which is 95 watts per port. (PoH white paper attached). This provides additional future proofing of the equipment to support forthcoming devices that require greater than PoE+

2.4 **Cabling.** The successful vendor will need to run two (2) new Category-6 cable drops from existing IDF racks to each Access Point location. Cables and connecting hardware shall at a minimum comply with mechanical and electrical requirements of EIA/TIA-568-B.2.

Questions to be addressed in your response:

1. List the manufacturer of the cables, patch panels, and connectors that you are proposing.

   Panduit / General Cable (PAN GEN)

2. Describe your test plan to ensure that all drops meet TIA/EIA standards. What will be delivered to the District as evidence that these tests were complete and successful?

   We will use Fluke Cables tester in accordance to TIA/EIA Cat 6 standards to test each cable and the test result will be provided to the District in electronic format. See Term and Condition letter in section … of the proposal item 11 for more details.

3. Describe the labeling standard you will use to identify drops at both the panel and the faceplate.
   We will use Panduit LS8EQ label sheets to document each cable.
   See Term and Condition letter in section 2 of the proposal item 12 for more details.
4. Describe the warranty on the cabling as well as who is making it: the installer or the manufacturer?
   As a Panduit Certified installer, there will be a 25 Years warranty for parts and Labor provided to the District.
   See Term and Condition letter in section 2 of the proposal item 16 for more details.

2.5 **Security.** The following section requests information concerning the capabilities of the proposed system for the purposes of securing a wireless network.

Questions to be addressed in your response:

1. Do you support industry standard authentication methods?
   Yes
2. Do you support industry standard encryption methods?
   Yes
3. Does the system allow for different security settings on a per SSID basis?
   Yes
4. Does the system allow for different WEP pre shared keys per SSID?
   Yes
5. Is WEP/TKIP/AES Encryption processing done in the Access Point?
   Yes
6. Does the system support the passing of LEAP credentials?
   No
7. Does the system support RADIUS authentication?
   Yes
8. Is the system capable of blocking Station-to-Station traffic?
   Yes
9. Can management traffic be blocked on all interfaces?
   Yes
10. Does the proposed system include an Intrusion Detection System (IDS/lPS)?
    Yes
11. Can the system block access by time of day and day of week?
    Yes
12. Does the Access Point have a built-in integrated packet capture tool?
    Yes

13. Does the Access Point have an integrated firewall?
    No
14. Do Access Points have a method for locking the unit to its mounting bracket?
    Yes
15. Is the system capable of intrusion detection, intrusion prevention, rogue AP neutralization, location tracking and real time packet capture and RF monitoring standard on the AP?
    ZD5000 is capable of IDS, rogue AP neutralization, location tracking and real time packet capture.
16. Accurate and automatic method of classifying real Rogue (on network) versus interfering neighbor networks.
    Yes
17. Detection of wireless bridges.
    No
18. Protection for denial of service attacks.
    Yes
19. Protection for MAC address spoofing.
    Yes
20. Detection of active network scanning tools.
    No
21. Can certificates be used to control access? If yes, provide details.
    Yes, pending on the requirements. Further discussion need.

2.6 **Management.** The following section requests information concerning the capabilities of the proposed system for the purposes of managing a wireless network. Note--do not mix and match features from different products.

Questions to be addressed in your response:

1. Describe your management system, centralized or other.
   Refer to SmartZone 100 Data Sheet in section 4
2. Is the management an external application?
   Yes
3. Can the wireless network be managed by SNMP?
   Yes
4. Can each Access Point be individually managed by SNMP?
   Yes
5. Can each Access Point be locally and individually managed by a secure web interface (https) that provides access to all system features?
   Yes
6. Can the management system display live heat maps?

Yes

7. Does the management system support historical reporting?
   Yes
8. Does the management system provide alerts and alarms?
   Yes
9. Does the management system provide a dashboard for a summary view of the health of the wireless network?
   Yes
10. Does the management system allow the creation of groups and policies?
    Yes
11. Can the management system push firmware updates to Access Points?
    a. Can the management system push firmware updates to Access Points without an administrative intervention?
    Yes
12. If a firmware update is required for an Access Point, does the configuration need to be recreated?
    No, configurations remain intact
13. Are all configuration parameters for Access Points represented in the management system?
    Yes, they are all represented in the management system.
14. Does the management system have administrative rights petitioning?
    Yes, there is role based access
15. Does the management system provide an audit trail of administrative actions?
    Yes
16. Can the management system integrate with dynamic mapping and/or GIS systems?
    The SmartZone100 intergrates with Google Maps
17. Can the management system provide the end user client visibility by device type, operating system, and hardware?
    Yes, client fingerprinting of device type, OS and hardware is provided in the management system
18. Can the management system provide disaggregated traffic information?
    Yes, by AP, client, SSID, site, etc
19. Can the management system provide application prioritization and throttling?
    The management system offers High and low priority per SSID in addition to Voice prioritization. There is currently no throttling on a per application basis. Ruckus integrates with firewall solutions that provide more sophisticated DPI and throttling capabilities.

20. Does the management system provide visibility and control of applications in use by devices? *No, in a future release scheduled for late 2015 these features will be made available*
    a. Can it block applications?
    b. Can it throttle applications?
    c. Can it set 802.11e priority on applications?

21. What sorts of historical information and reporting can be generated?

    Traffic Reporting, Traffic reports include: access point traffic, client potential throughput, throughput estimate of clients, top APs by traffic by volume, and top client devices by traffic volume.
    Subscriber and Session Management Reports Traffic reports include: client fingerprint (iOS, Android, Windows, etc.), client health, number of sessions, number of unique devices, session bytes transferred, session duration, and top clients by traffic volume.
    Operational Reports Operational reports can be used to look at how the various elements in the network are performing. The options here include: access point response time, controller hardware utilization, top 10 AP reboots, top 10 APs with the most topology changes, and top 10 APs with the longest response times

2.7 **Authentication & Encryption Specification**. Please describe the following in your solution:

1. Support for the following:
    a. MAC based authentication. *Yes*
    b. 802.1x based authentication and 802.1x supplicants. *Yes*
    c. WPA2/AES link layer encryption. *Yes*
    d. WEP link layer encryption. *Yes*
    e. WPA/TKIP link layer encryption. *Yes*
2. Username/password authentication or token-based access.
3. Web-based authentication. *Yes*
4. Integration with Microsoft Active Directory and content filtering systems. *Yes*
5. Provide multiple levels of access for guest, staff and students with network segregation based on Active Directory policies. *Yes*
6. Configuration across multiple network layers without having to enter configuration information into the AP. *Yes*
7. System must support roaming across APs with no special client-side software. *Yes*

2.8 **Planning and Design**. In addition to a live site survey, the following section requests information concerning the capabilities of the proposed system for the purpose of a predictive network design in order to facilitate the installation of an 802.11a/n/ac and 802.11b/g/n network.
Please complete the following additional questions:

1. Will you perform a live survey of each District location? *Yes*
2. For predictive site surveys, please specify the vendor name and part number of the planning tool used (Do not mix and match features from different tools).
   Ekahau NIC-300
3. Will you design the coverage in each District location, assist in designing a security plan, and build out a reasonable VLAN structure on the new switches?
   Yes
4. Our experience shows that predictive designs that do not take into account the physical elements of a building will result in designs that are under-provisioned and will force additional access points to be added later. Can attenuation be assigned and adjusted to all walls, the student body, and other objects to increase the accuracy of the predictive RF design? *Yes*
5. Can bandwidth requirements be taken into account for the predictive design?
   Yes
6. Does the planning tool predict RSSI, SIR, SNR and data rates?
   Yes
7. ls the system model designed for 2.4GHz and 5GHz deployments?
   Yes
8. Describe the proposed wireless network design; the explanation should include the number and location of Access Points.
   Please Refer to section 5 of this proposal, there you will find a breakdown of each AP model, location, and other information such as cost.
9. Describe any issues you foresee mitigating the existence of the schools' heterogeneous wired networks.
   None
10. List the number of cable runs required for all proposed Access Points, data and power.
    One
11. List the vendor software and wireless adapter that was used to perform the site survey.
    Ekahau NIC-300
12. List all proposed components for the wireless network.
    Ruckus Smart Zone 100
    Ruckus ZR 700

Ruckus ZR 600

13. List the physical mounting methods of the controllers/APs and security of the mounting.
    Manufacturer Suggested Mount part number 902-0108-0000
14. Attach data sheets for all proposed equipment.
    See section 4.

2.9 **Redundancy**. If the proposed system requires one or more dependent controllers to operate the wireless system, the bidder shall supply a second redundant controller in case the primary one fails. This second unit will be placed in service as a "slave" to the primary unit. If the primary unit fails the "slave" unit will automatically take over. The primary and redundant controllers will have the capacity to add at least 15% additional WAP units (based on the total number of WAP units required to cover the entire district) without the need for additional licensing of those units.

2.10 **Support**.

Questions to be addressed in your response:

1. Describe the process for reporting a hardware failure in one of the components of the proposed system.
   Open a case with Ruckus Support
2. What methods are available for contacting tech support (phone, email, website, etc.)? What are the times for response and problem resolution?
   All of the above, including chat
3. How quickly can replacement components be delivered on-site?
   As early as next business day for critical components, and standard lead time generally 1-2 weeks for AP's. The recommendation is to have a few cold spare AP's on hand.
4. What is the standard warranty and maintenance for each of the components proposed?
   Limited Lifetime warranty
5. What is the upgrade path for management software and is there an annual support fee for the software?
   There are quarterly software updates available which is included in the annual support fee.
6. If the District elects to discontinue annual maintenance payments, what is the impact on the functioning of the Wireless LAN? Will it continue to operate? Can it still be managed?
   Yes, it will continue to operate and it will still be manageable.

7. Describe the product training offered and included.
   As part of the installation and handoff documentation / transfer knowledge phase of the project, training on the systems and customization will be provided at no charge to the District. Additional Manufacturer Certification class will also be available for 2 of the District staff members will be provided at no charge. Note that the class and certification availability is limited and prerequisite studies might be needed.
8. Please provide a breakdown of the annual cost for email and phone support, software and firmware upgrades for WAPs, controllers if necessary, and the software that controls the WAPs or controllers or both.
   The annual fee associated with 1030 Access Points, and Controllers is $18,995.00 / year and is subjected to local state tax fees.

2.11 **Training Plan**. The District requires that the supplier provide comprehensive training addressing the needs of user, administrative, technical, and operational personnel. The supplier is encouraged to propose innovative approaches to training such as programmed self-study guides, online tutorials, DVDs, CD-ROMs and computer based training. All training will include step-by-step detail that will enable employees unfamiliar with the system to perform the described activities.

2.12 **Training Documentation**. Comprehensive high quality user documentation is essential for the success of this project. Documentation shall be provided that covers all system hardware and software. All documentation provided shall be in written form. Documentation should also be provided in electronic form and network accessible.

2.13 **Sites included in this RFP**.

1. Alisal Elementary School, 1454 Santa Rita Rd. Pleasanton 94566
2. Donlon Elementary School, 4150 Dorman Rd. Pleasanton 94588
3. Fairlands Elementary School, 4151 W. Las Positas Blvd. Pleasanton 94588
4. Hearst Elementary School, 5301 Case Ave. Pleasanton 94566
5. Lydiksen Elementary School, 7700 Highland Oaks Dr. Pleasanton 94588
6. Mohr Elementary School, 3300 Dennis Dr. Pleasanton 94588
7. Valley View Elementary School, 480 Adams Way Pleasanton 94566
8. Vintage Hills Elementary School, 1125 Concord St. Pleasanton 94566
9. Walnut Grove Elementary School, 1999 Harvest Rd. Pleasanton 94566
10. Hart Middle School, 4433 Willow Road Pleasanton 94588
11. Harvest Park Middle School (including Harvest Park Pre-School), 4900 Valley Ave. Pleasanton 94566
12. Pleasanton Middle School, 5001 Case Ave. Pleasanton 94566
13. Amador Valley High School, 1155 Santa Rita Rd. Pleasanton 94566
14. Foothill High School, 4375 Foothill Rd. Pleasanton 94588
15. Village High School, 4645 Bernal Ave. Pleasanton 94566
16. Pleasanton Unified School District, 4665 Bernal Ave. Pleasanton, CA 94566

2.14 **Written Guarantee**. The winning bidder will supply a written guarantee that the hardware will be warranted from defects for a minimum of 3 years for installation and a minimum of one (1) year for the hardware. The bidder will also warrant software defects for a period of one (1) year. Cabling will be covered through manufacturer's warranty for a minimum of fifteen (15) years.

SECTION 3: OTHER RFP REQUIREMENTS

3.1 **Equal Opportunity**. The responder must be an Equal Opportunity Employer, and shall certify that they are in compliance with the Civil Rights Act of 1964, the State Fair Employment Practice Act, and all other applicable Federal and State laws and regulations relating to equal opportunity employment, including Executive Order No. 11246 of September 24, 1965.

3.2 **Errors and Omissions**. If a responder discovers an ambiguity, conflict, discrepancy, omission, or other error in the RFP, they shall immediately notify the District of such error writing and request clarification or modification of the document. Modifications will be made by addenda. Such clarification shall be given by written notice to all parties who have been furnished an RFP for bidding purposes, without divulging the source of the request for same. Insofar as practicable, the District will give such notice to other interested parties, but the District shall not be responsible therefore.

If a responder fails to notify the District, prior to the date fixed for submission of bids of an error in the RFP known to them, or an error that reasonably should have been known to them, they shall bid at their own risk; and if they are awarded the contract, they shall not be entitled to additional compensation or time by reason of the error of its later correction.

The bidder should carefully examine the entire RFP and early addenda thereto, and all related materials and data referenced in the RFP or otherwise available to them, and should become fully aware of the nature and location of the work, and the conditions to be encountered in performing the work.

3.3 **Bidder Agreement**. In compliance with this request for proposal, the responder will propose and agree to furnish all labor, materials, transportation, and services for the work described and specifications and for the items listed herein.

3.4 **Proposal Agreement**. If the responder is an individual or an individual doing business under a firm name, the proposal must, in addition to the firm name, be signed by the individual; if the responder is a partnership, the proposal should be signed with the partnership name by one of the partners; if a corporation, with the name of the corporation by an officer authorized to execute a proposal on behalf of the corporation.

3.5 **Non-Collusion**. The completed Non-Collusion declaration must be returned with the proposal.

PROPOSAL SIGNATURE PAGE
(Complete and return with bid submission)

IT Management Corporation

Company Name

5201 Great America Parkway Suite 320	Santa Clara	CA	95054
Address	City	State	Zip

408-837-7000	408-739-1101
Telephone Number	Fax Number

	Feb 4, 2015
Signature	Date

Arman Eghbali	Manager
Printed Name	Title

SLED@ITMGMT.com	26-4508448
Email Address	Federal ID Number

143033893

E-Rate Service Provider Identification Number (SPIN).

NONCOLLUSION DECLARATION TO BE EXECUTED BY RESPONDER AND SUBMITTED WITH PROPOSAL

(Public Contract Code section 7106)

The undersigned declares:

I am the __Manager_____ of _IT Management Corp._, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _2/4/2015___ [date], at _Santa Clara__ [city], __CA___ [state].

Signature:

Print Name: Arman Eghbali
Title: Manager
Firm Name: IT Management Corporation

REFERENCES

Reference #1

1. Customer Name: Cupertino Union School District
2. Address (City, State & Zip): 1309 South Mary Avenue #150 Sunnyvale, CA 94087
3. Customer Contact Name: Steve Bauer, IT Director
4. Phone: 408-252-3000 Ext. 61338
5. Amount of Project: $1,750,000
6. Approximate Completion Date: November 2013
7. Description of Project: Within time span of four months, new Brocade network infrastructure was installed. Switches were installed in over 26 school locations and the network was upgraded from 100Mb/s backbone 1Gb/s to 10Gb/s backbone network, along with 1Gbs per classroom. This was all done their existing OM 1 fiber.

Reference #2

1. Customer Name: Franklin McKinley School District
2. Address (City, State & Zip): 645 Wool Creek Drive, San Jose, CA 95112
3. Customer Contact Name: Hung Nguyen, IT Director
4. Phone: 408-263-8000
5. Amount of Project: $1,489,000

6. Approximate Completion Date: November 2014

7. Description of Project: Their twelve year old Three Com, HP and Cisco network was upgraded to Brocade ICX products. Over 200 switches were installed to all school sites using existing fiber optics to 10Gbs backbone throughout District Office. Wireless Access Points were also deployed as needed throughout the project

Reference #3

1. Customer Name: South San Francisco Unified School District

2. Address (City, State & Zip): 398 B Street, South San Francisco, CA 94080

3. Customer Contact Name: Dwane Camp Sr

4. Phone: 650-615-7927

5. Amount of Project: $1,800,000

6. Approximate Completion Date: August 2015

7. Description of Project: Installed brand new six strand single fiber mode to MDF to IDF at each school. Installed new Brocade ICX switches to replace existing Cisco switches with 10 Gbs connectivity with capability to move to four Gbs. Over 400 Wireless Access Points were installed in the District. This work in still in progress

February 4, 2015

Pleasanton Unified School District
Ms. Myla Grasso
Coordinator, Purchasing, Warehouse, and Graphics
Pleasanton Unified School District
4750 First Street
Pleasanton, CA 94566
925.426.4335 (W) 925.462.6065 (FAX)
mgrasso@pleasantonusd.net

Executive Overview

IT Management Corporation is pleased to provide a comprehensive proposal for Pleasanton Unified School District Wireless LAN Rollout RFP 2014-15.04. IT Management has been providing systems and networking services since 2009.

With over 16 years of IT project management experience, Mr. Arman Eghbali, President of IT MGMT, had the privilege to work with many local school districts in Northern California. We are looking forward to provide the same excellent service to Pleasanton Unified School District.

We at IT Management believe that we can provide a superior service to Pleasanton Unified School District vs.as to other providers because of the following reasons:

- ✓ Local offices in Silicon Valley
- ✓ Exceptional and thorough understanding of K-12 Campus Network Infrastructure
- ✓ In-depth understanding of layer 1- 7 networking architect
- ✓ Brocade Authorized Elite Partner
- ✓ Proven relationship to serve our customers
- ✓ Expert in deployment coverage Northern California
- ✓ Solution oriented and not vendor focused

School References

- Cupertino Union School District
- Franklin McKinley School District
- Gilroy Unified School District
- Mount Pleasant Elementary School District
- Latino College Preparatory Academy
- South San Francisco Unified School District

IT Management and Technology Partnerships….Experience will set you free.

Date: 2/4/2015

Ms. Myla Grasso
Coordinator, Purchasing, Warehouse, and Graphics
Pleasanton Unified School District
4750 First Street
Pleasanton, CA 94566
925.426.4335 (W) 925.462.6065 (FAX)
mgrasso@pleasantonusd.net

Re: Proposer Background RFP #20143

Dear Myla Grasso,

IT Management Corporation, established in 2009, is a California Corporation head quartered at 5201 Great America Pkwy Ste. 320 Santa Clara, CA 95054.

The Engineering Services office located at 4320 Stevens Creek Blvd. Ste. 165 San Jose, CA 95129 servicing the Northern region California, work force of 35 employees dispatched from this location.

IT Management Corporation has been involved since its inception in 2009 for design, deployment, and implementation of complex network infrastructure. Also providing managed network services and support.

IT Management has been providing systems and networking services since 2009 for Network switching, Infrastructure cabling, UPS power backup systems, and Unified Communications.

With over 16 years of IT project management experience, Mr. Arman Eghbali, President of IT MGMT, had the privilege to work with many local school districts in Northern California.

We at IT Management are qualified to provide a superior service to Pleasanton Unified School District because of the following reasons:

- Local offices in Silicon Valley to respond and dispatch resources
- Exceptional and thorough understanding of K-12 Campus Network Infrastructure demands
- In-depth understanding of layer 1- 7 networking architecture
- Brocade Authorized Elite Partner
- Proven relationship to serve our customers first priority
- Expert in deployment coverage Northern California
- Solution oriented and not vendor focused
- Network system design and integration since 2009

Our technology services background is in consulting, designing, and implementation of IT infrastructure for campus networks, district office data center, server virtualization, network security, structured cabling, and UPS power management systems.

Our Duns and Bradstreet #832855246 commercial data reference identifier.

We thank you for the opportunity to provide our response to RFP #2015-15.04.

Sincerely,

Arman Eghbali MS, MBA
VP, Engineering Services
888-970-2070 Ext. 1144
AEghbali@ITMGMT.com
www.IT-Management.com

Company Profile

IT Management Corporation has been serving the technology needs of private businesses and public sector organizations since 2009. We specialize in providing network assessment, planning and design, implementation, project management, documentation, voice and data consulting and convergence, training and technical services for new projects and existing systems.

We have organized our business to accommodate the individual funding, procurement and specific technology needs of each of our customers. We make sure that we will provide to you the services and support to meet the current and future technology requirements for your business. Our customers include educational institutions, insurance, commercial, and health care companies, law firms, art galleries, non-profit organizations, small to medium as well as Fortune 1000 businesses.

We always offer a relationship that provides both your company and ours an open environment that is conducive to growing a strategic business partnership. To continue to meet your growing needs, we offer 24-hour availability, manufacturer resources, future planning and consulting, ongoing relevant training for your staff, recommendations for "best practices" solutions for any given need or challenge and our team members have the highest level of technical certification and years of experience with various operating systems, software, security, networking and hardware.

Our operations staff insures transparent procurement and delivery for equipment along with expert pre and post project support. A project manager will be assigned to your account so we will always have a team member available to facilitate the scope of work, equipment receipt, technical services, project time line, and staff training.

In making this commitment to you, we provide the highest level of expertise and quality of service that is completed to your satisfaction in a timely and up to date manner. Our responsive service and support is a value we provide to you. With this, we continue to meet your technology requirements in a growing and evolving partnership.

IT Management Corporation is a highly qualified and professional Voice and Data network consulting and service organization. We select our clientele very carefully to insure that our services match the needs of each client and then assign an individual Account Engineer to manage or co-manage each client's information system(s). By doing this we are able to establish a level of continuity and familiarity with each account's business processes, users and information systems, and be in the best position to assist and suggest future additions and modifications to each system.

IT Management offers you a comprehensive suite of network integration services. At IT Management, you will find virtually everything you need for networking; from maintenance of your existing infrastructure to the start-to-finish implementation of a new network.

Services Overview

- Network Assessment
- IT Planning & Design
- IT Consulting
- IT Implementation
- Project Management
- Network Documentation
- Voice & Data Consulting
- Voice & Data Convergence Deployment
- IT Training
- Cloud Based Data Backup, 101 RDB
- Cloud Based Text Messaging Services, 101 TEXT
- Cloud Based PBX Systems, 101 VOICE

ASSESSMENT IT Management can audit your network's capabilities and limitations. Using the latest in diagnostic equipment, we can examine every node on your network and pinpoint bottlenecks, potential bandwidth issues, and overall network performance. We'll identify specific risks and recommend cost-effective changes.

PLANNING & DESIGN IT Management thinks about your network strategically, focusing on where you want your network to take your business. We can perform a thorough needs analysis, consulting you on enterprise-level IT planning. We'll explore a variety of infrastructure options to maximize your installed capacity, minimize operating costs, and continue to meet your needs as you expand your business.

IMPLEMENTATION Our certified engineers implement your network from beginning to end, including procurement, staging and pre-configuration, installation, and final acceptance testing.

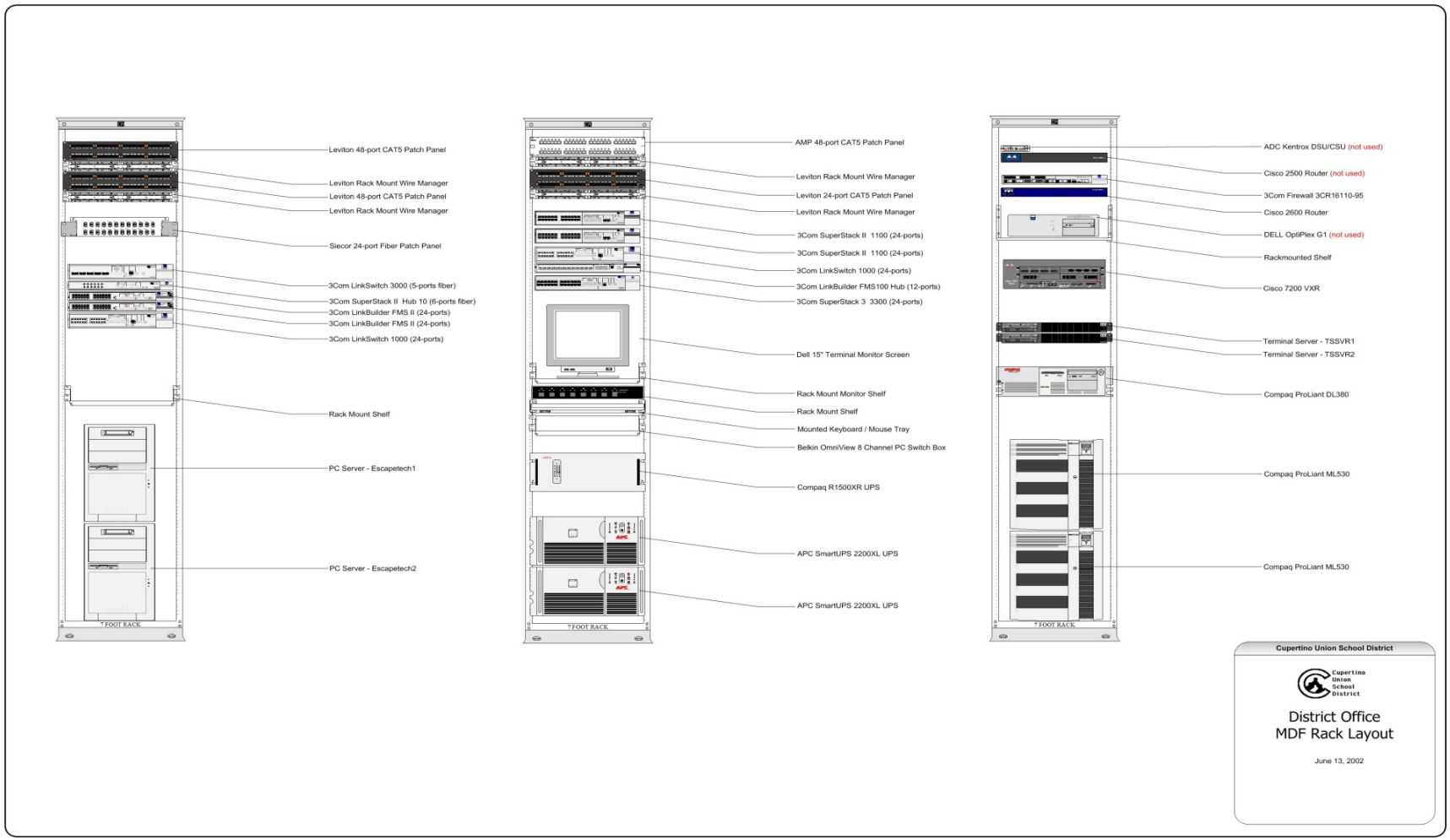
PROJECT MANAGEMENT A single point of contact - one of our accredited Account Engineers - can organize, manage, and document each stage of a network implementation, relocation, or a variety of other networking-related projects. With a clear statement of work, detailed plans, timelines, and weekly status reports, you can be sure that your project will be implemented on time and within budget.

DOCUMENTATION A well-documented network protects your investment. IT Management can clearly define your ever-changing network with physical and logical layouts and customized Visio formats. Our unique documentation system provides inventory tracking and allows you to easily illustrate your network to senior management.

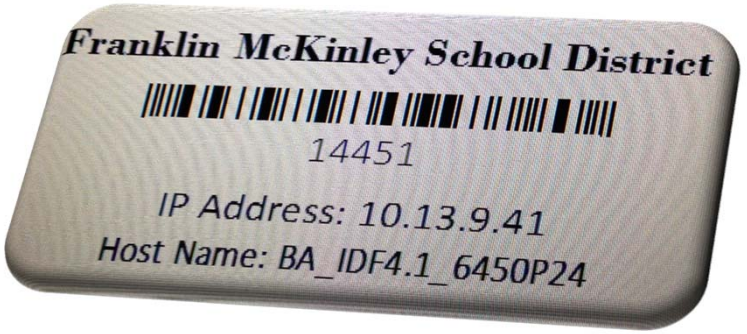
VOICE AND DATA CONSULTING Today's IT managers struggle to anticipate and manage carrier issues. We can determine which carrier best meets your usage requirements, or we can put together a telecommunications RFP, so you can efficiently evaluate carrier services yourself. We will mentor your IT staff on WAN technologies, carrier contracts and billing, and savings opportunities

VOICE & DATA CONVERGENCE DEPLOYMENT We can help you realize the promises of network convergence - lower costs and simplified management - by turning voice into data packets and running them over efficient IP as a VoIP, ATM, SIP or frame relay networks

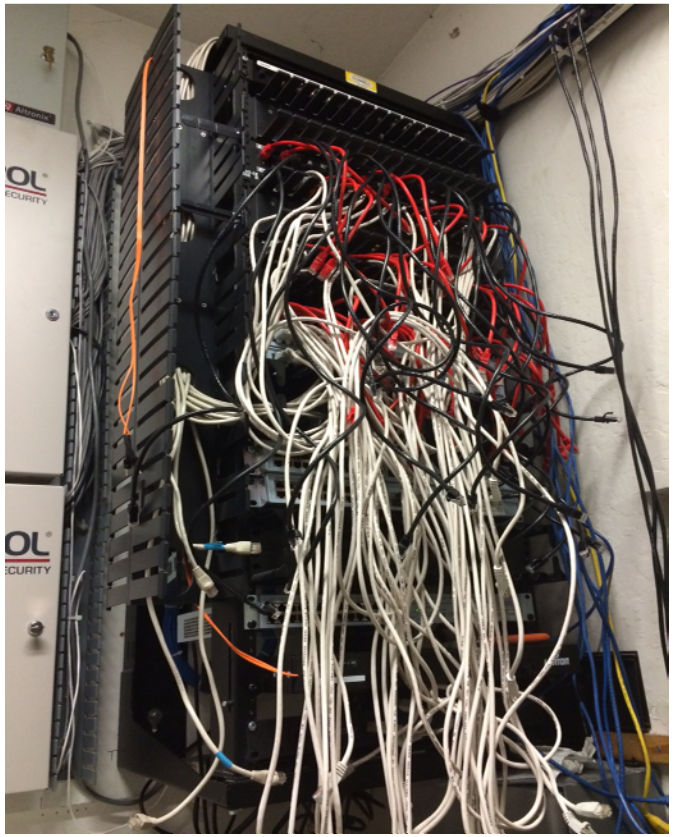
Sample Rack Layout



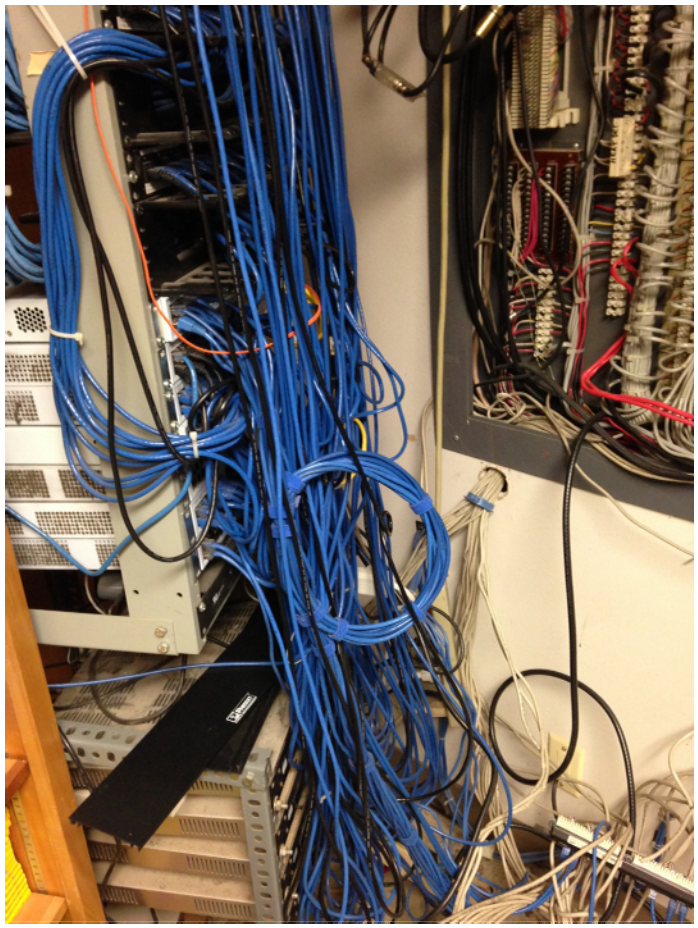
Equipment Sample Asset Tag



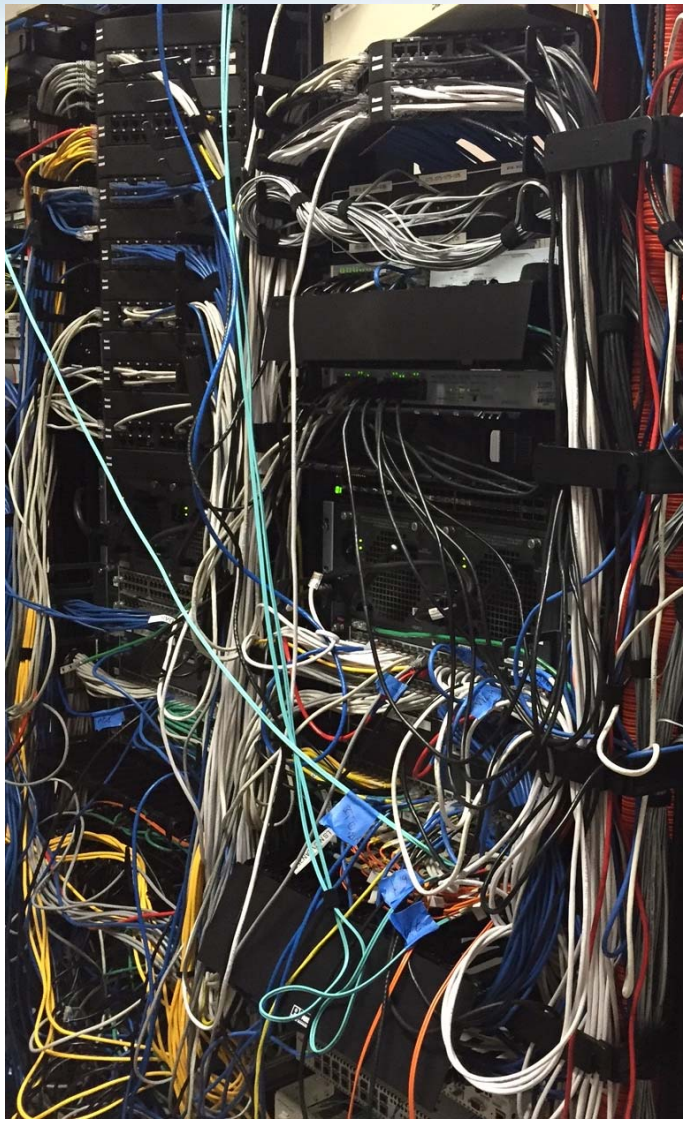
IDF Closet - Before & After



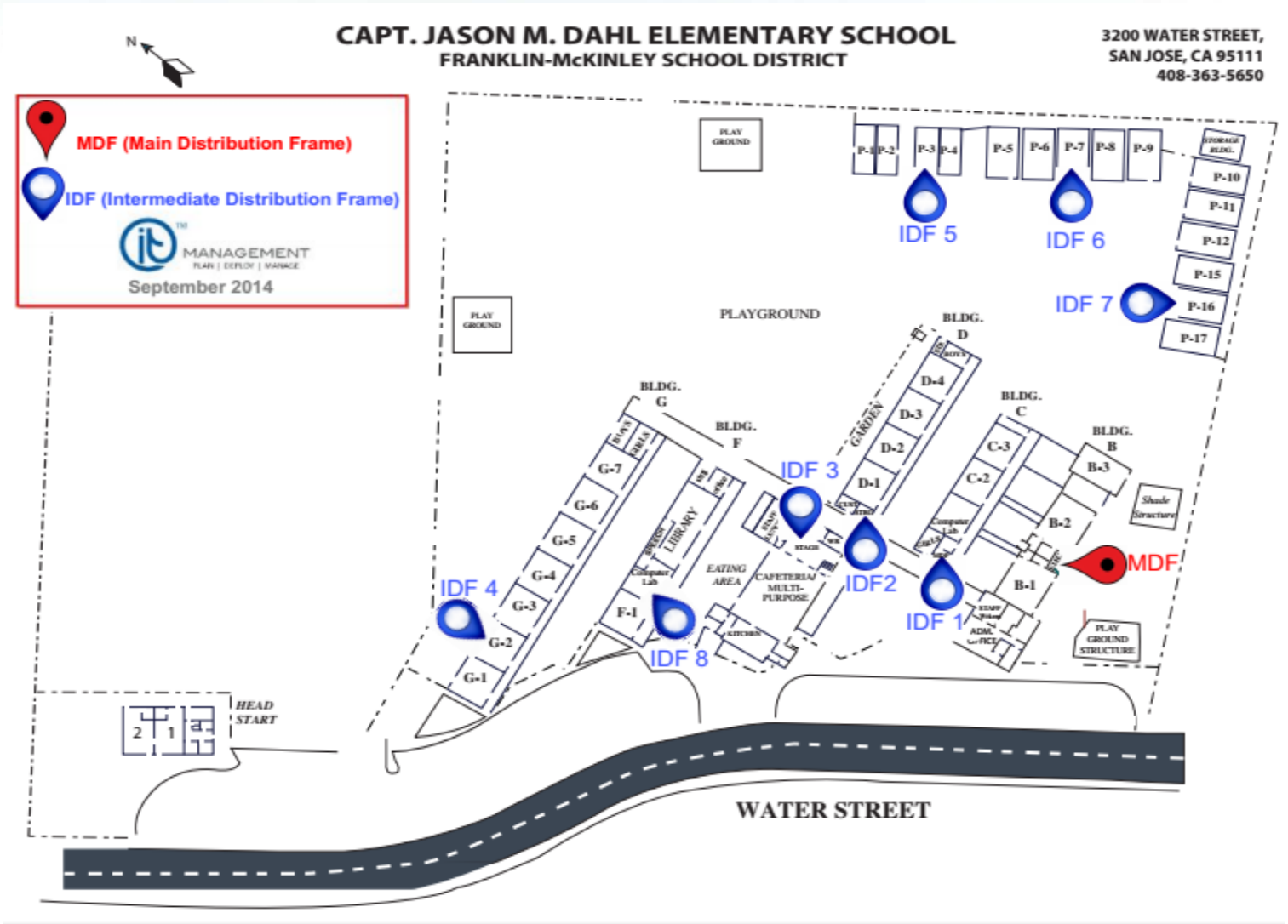
IDF Closet - Before & After



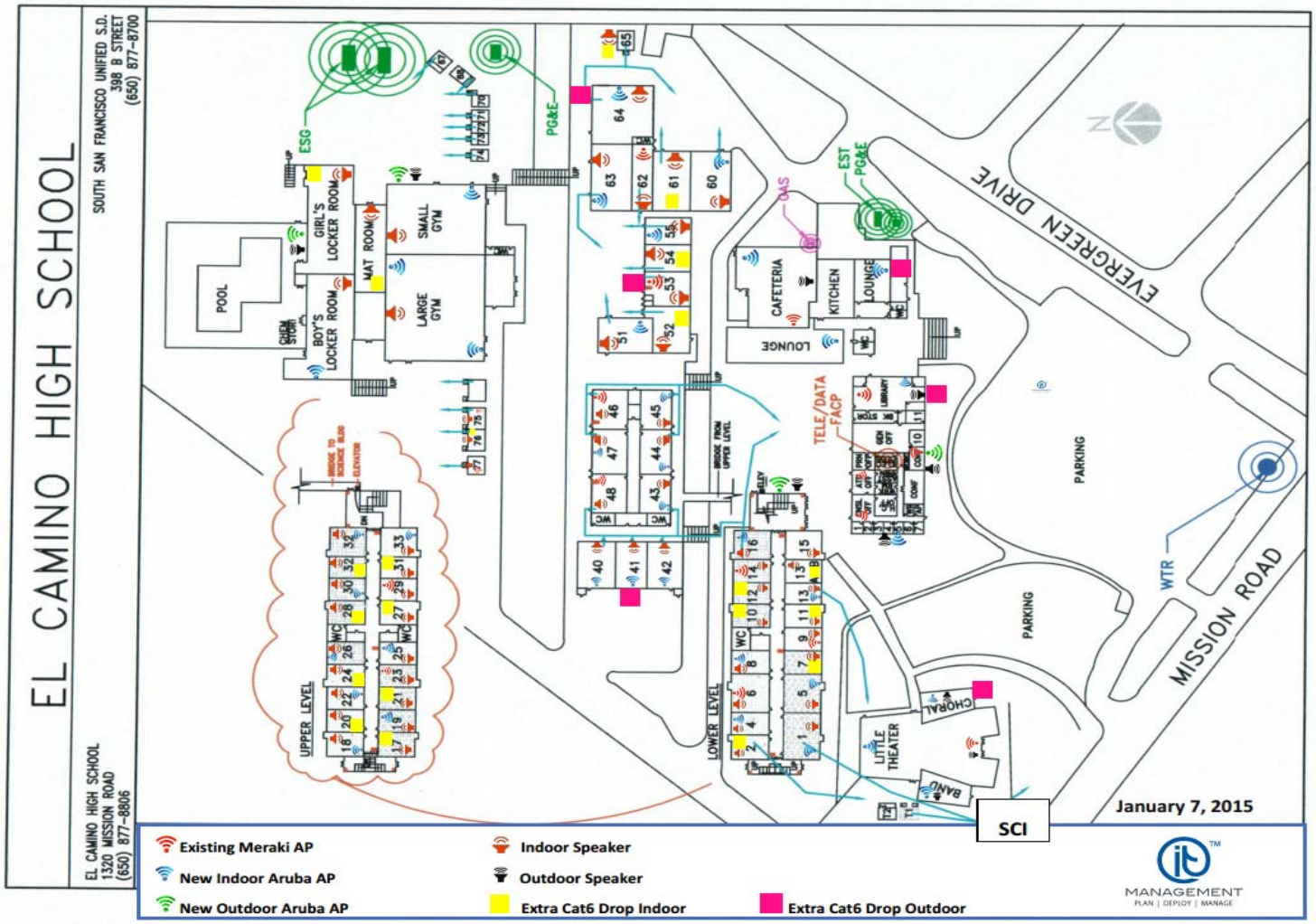
Data Center



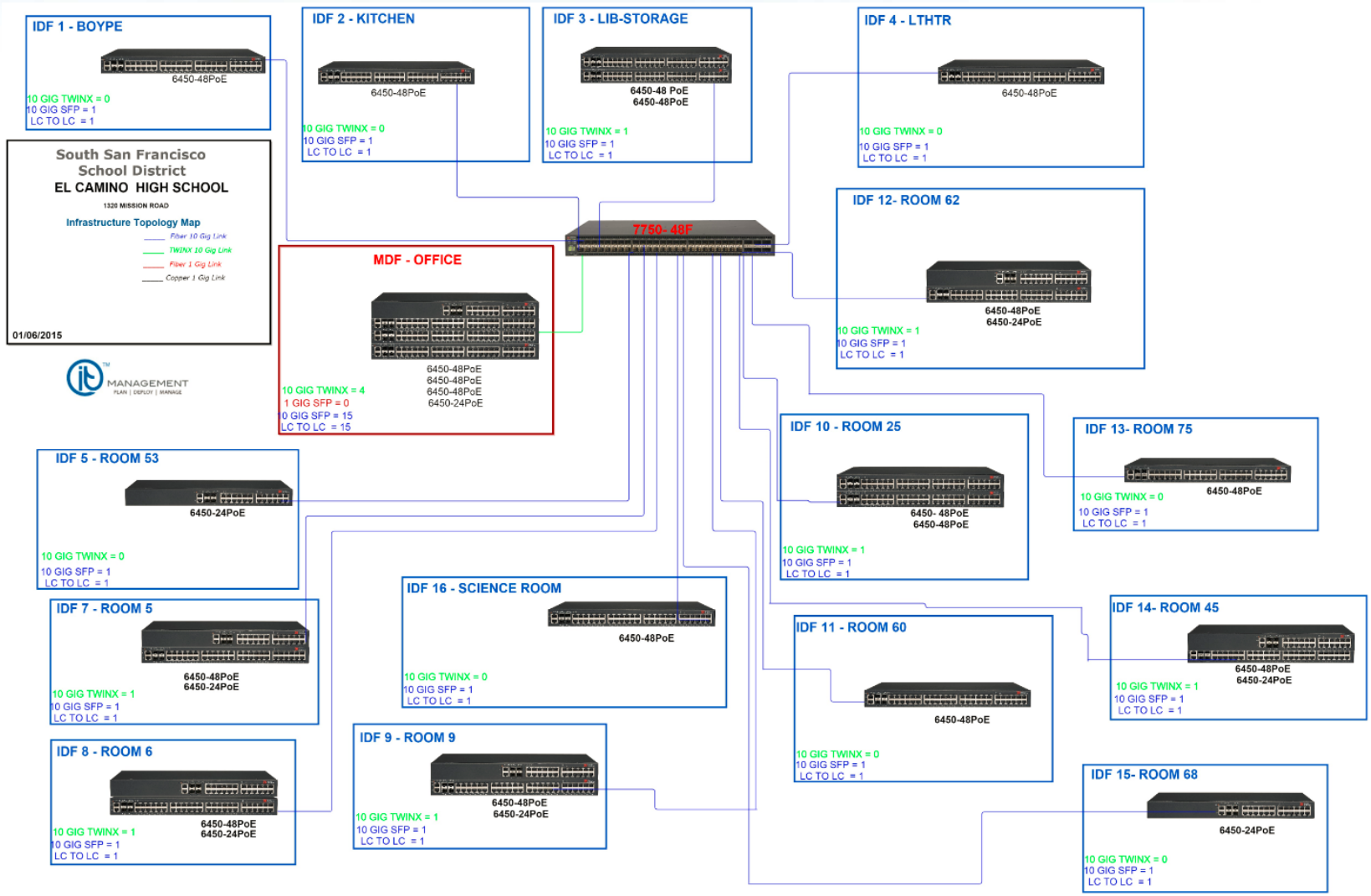
Sample Site Map



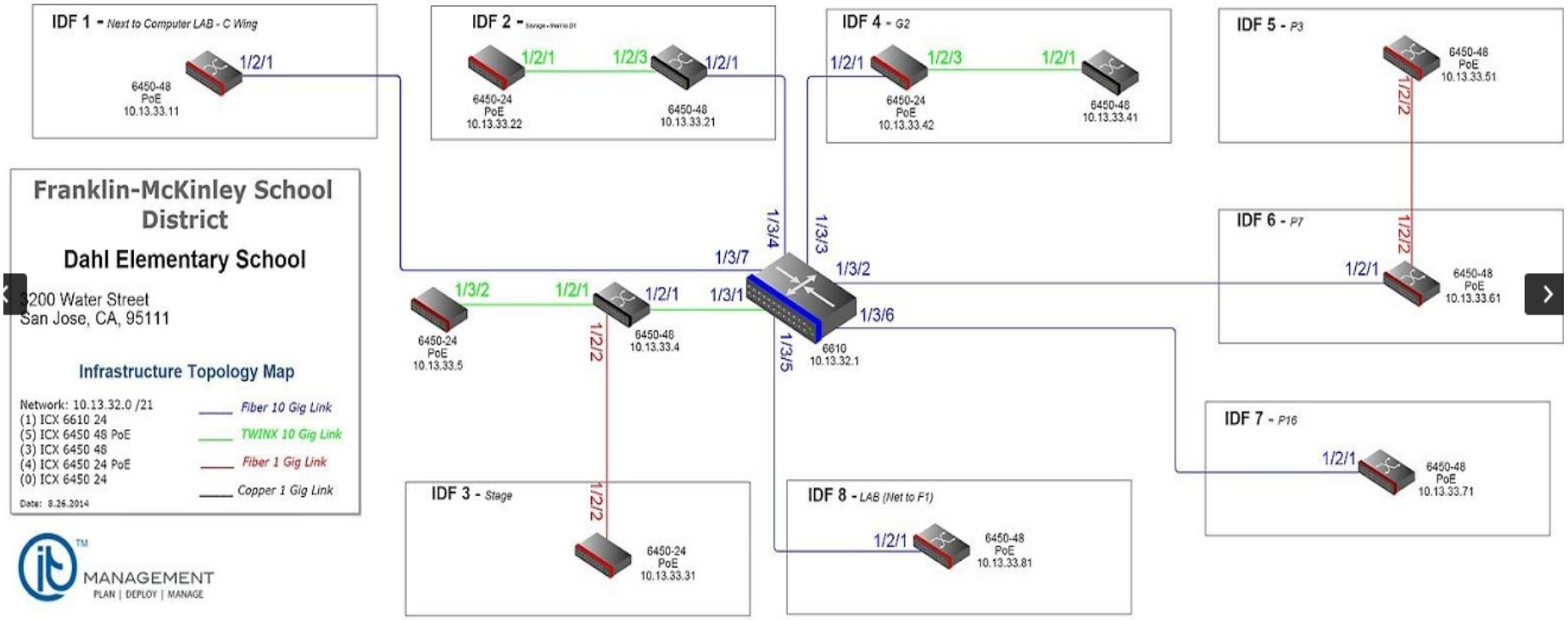
Sample Site Map



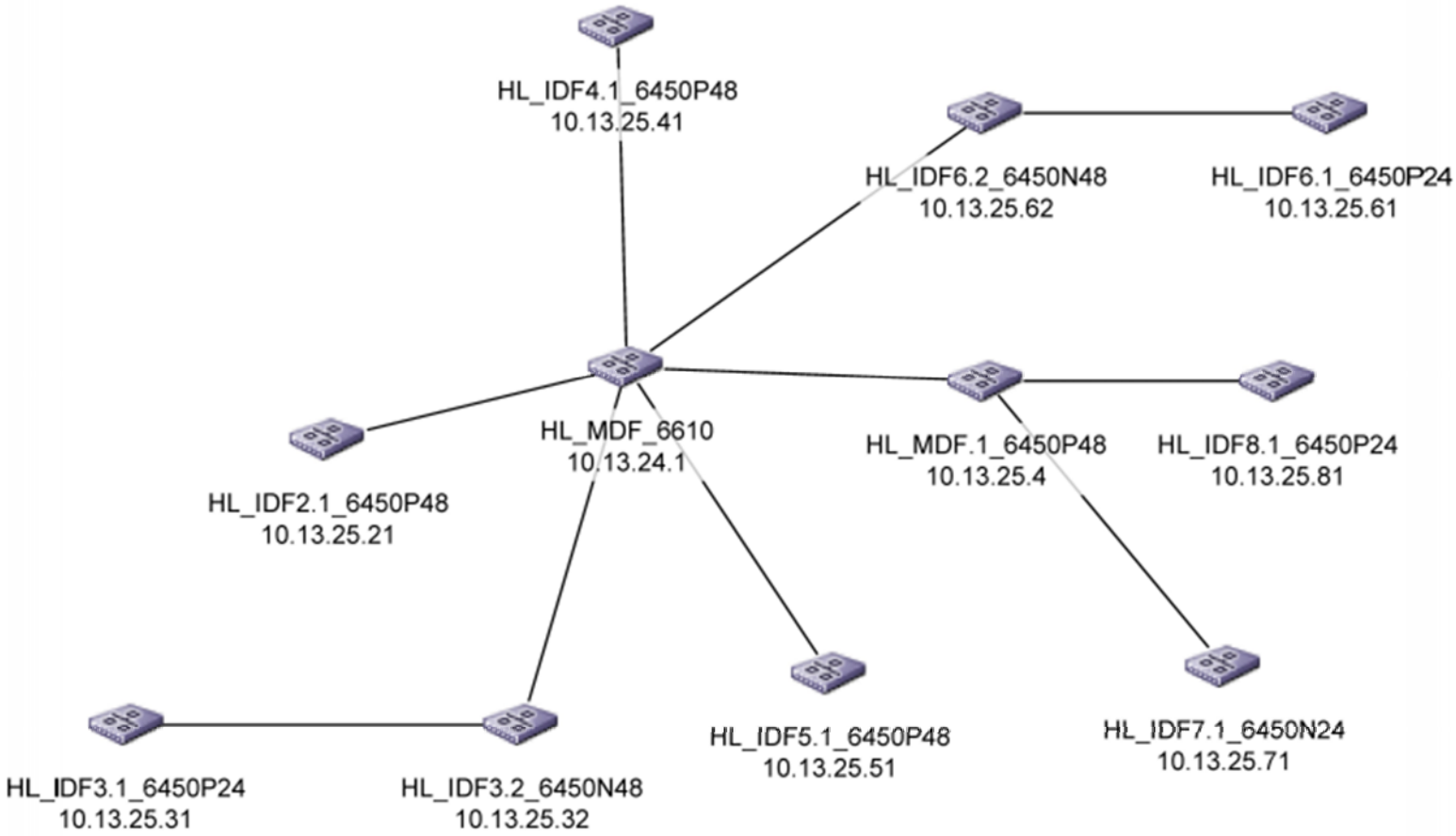
Sample Topology Map



Sample Topology Map



Sample Topology Map



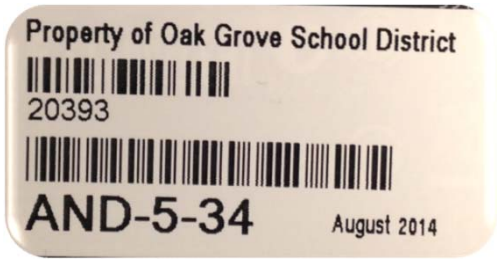
Staging Area

- **Franklin-McKinley District School / IT Department**
  - **Over 200 switches have been programmed,**

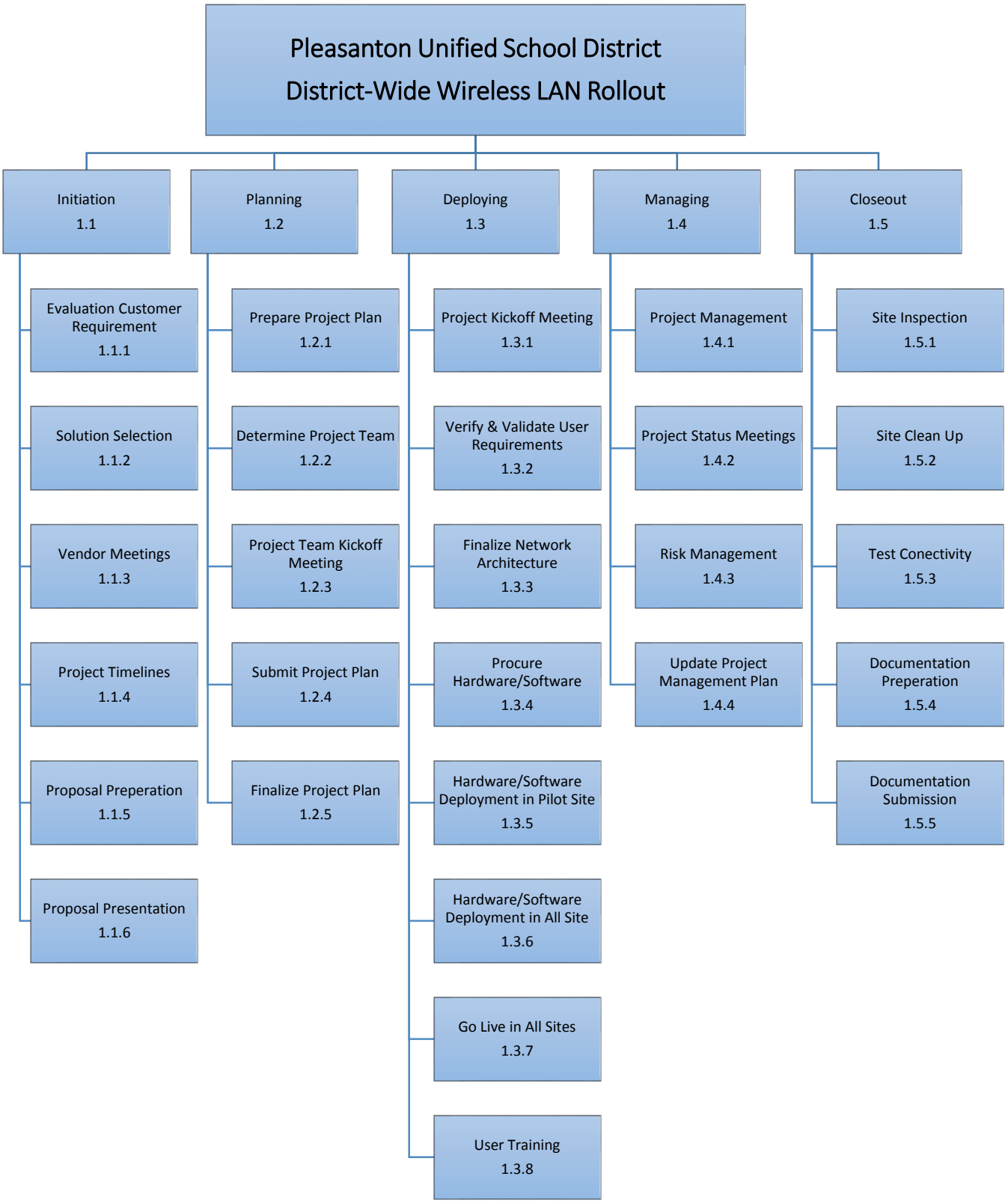
Oak Grove School District - Chromebooks Project

Oak Grove School District - Chromebooks Project

Oak Grove School District - Chromebooks Project



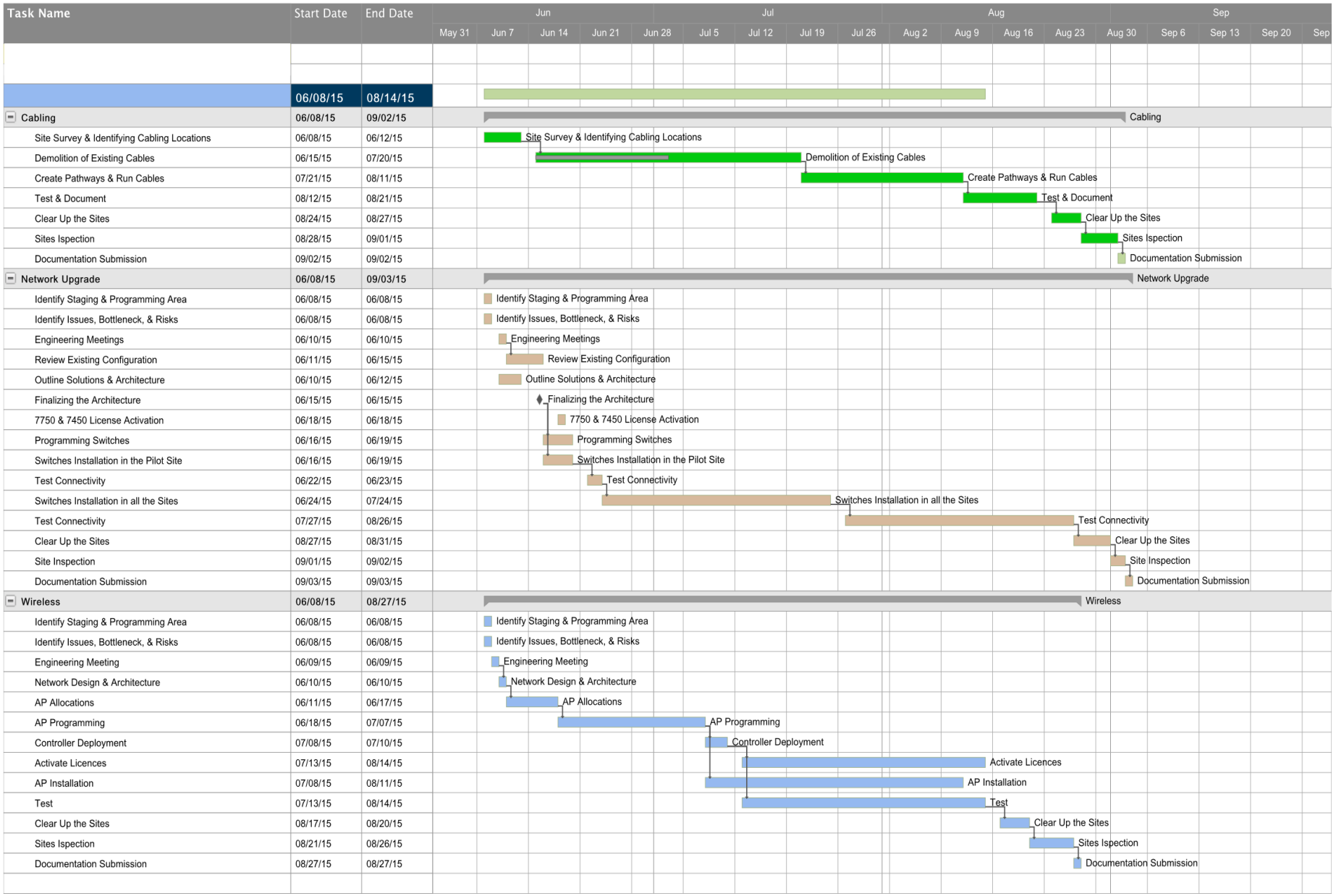
Oak Grove School District - Chromebooks Project


Pleasanton Unified School District
District-Wide Wireless LAN Rollout
Initiation
1.1
Planning
1.2
Deploying
1.3
Managing
1.4
Closeout
1.5
Evaluation Customer Requirement
1.1.1
Solution Selection
1.1.2
Vendor Meetings
1.1.3
Project Timelines
1.1.4
Proposal Preperation
1.1.5
Proposal Presentation
1.1.6
Prepare Project Plan
1.2.1
Determine Project Team
1.2.2
Project Team Kickoff Meeting
1.2.3
Submit Project Plan
1.2.4
Finalize Project Plan
1.2.5
Project Kickoff Meeting
1.3.1
Verify & Validate User Requirements
1.3.2
Finalize Network Architecture
1.3.3
Procure Hardware/Software
1.3.4
Hardware/Software Deployment in Pilot Site
1.3.5
Hardware/Software Deployment in All Site
1.3.6
Go Live in All Sites
1.3.7
User Training
1.3.8
Project Management
1.4.1
Project Status Meetings
1.4.2
Risk Management
1.4.3
Update Project Management Plan
1.4.4
Site Inspection
1.5.1
Site Clean Up
1.5.2
Test Conectivity
1.5.3
Documentation Preperation
1.5.4
Documentation Submission
1.5.5

IT MANAGEMENT
PLAN | DEPLOY | MANAGE

Pleasanton Unified School District

Project Timeline



BROCADE ICX 7450 SWITCH

ENTERPRISE LAN SWITCHING

Enterprise Stackable Switch Delivers Premium Capabilities and Ultimate Flexibility

HIGHLIGHTS

- Provides a unique modular design with three expansion slots for a choice of 1 GbE, 10 GbE, or 40 GbE uplinks, providing ultimate flexibility and "pay as you grow" scalability
- Delivers market-leading stacking scalability with up to 12 switches per stack, 160 Gbps of stacking bandwidth, and long-distance stacking using open-standards QSFP+ ports to enable single point management across the campus
- Provides OpenFlow support in true hybrid port mode, enabling Software-Defined Networking (SDN) for programmatic control of network data flows*
- Offers Power over HDBaseT (PoH), to power video surveillance and video conferencing equipment, VDI terminals, and HD displays directly from the switch

The Brocade® ICX® 7450 Switch delivers the performance, flexibility, and scalability required for enterprise Gigabit Ethernet (GbE) access deployment. It offers market-leading stacking density with up to 12 switches (576 1 GbE and 48 10 GbE ports) per stack and combines chassis-level performance and reliability with the flexibility, cost-effectiveness, and "pay as you grow" scalability of a stackable solution. In addition, this stackable switch is the first in its class to offer 40 GbE uplinks, enabling enterprises to dramatically increase their network capacity while using their existing optical wire infrastructure.

The unique design of the Brocade ICX 7450 provides three modular slots, offering up to 12 1/10 GbE SFP/SFP+ ports, 12 10GBASE-T ports, or up to three 40 GbE QSFP+ ports for uplink or stacking. As a result, the Brocade ICX 7450 can easily deliver sufficient bandwidth between the edge and aggregation layers to support expanding video traffic, VDI adoption, and high-speed wireless 802.11ac deployment.

The Brocade ICX 7450 is an ideal network solution for campus network 1 GbE access or small aggregation deployment with 10 GbE or 40 GbE uplinks to the core. The Brocade ICX 7450 also makes a very suitable data center Top-of-Rack (ToR) solution, delivering a mix of 1 GbE and 10 GbE server connectivity ports with 10 GbE or 40 GbE uplinks to the data center aggregation or core.

*OpenFlow support to be available in a future software release.

SCALE-OUT AS DEMAND GROWS

The Brocade ICX 7450 is easy to deploy, manage, and integrate into both new and existing networks. Organizations can buy only what they need today, and easily scale out as demand grows and new technologies emerge.

With three modular slots, the Brocade ICX 7450 enables organizations to grow their networks when necessary. Organizations can initially deploy 1 GbE or 10 GbE uplink ports and upgrade to 40 GbE ports on-demand with a new, high-speed module.

The Brocade ICX 7450 also offers a low-cost entry point. By providing the flexibility of a stackable switch, the Brocade ICX 7450 saves organizations from having to invest in a costly chassis upfront and tie up valuable capital. Instead, they can buy a single Brocade ICX 7450 Switch to get started and add new Brocade ICX 7450 Switches to the stack as their business grows.

FLEXIBLE, LONG-DISTANCE STACKING FOR THE MOST DEMANDING ENTERPRISE ENVIRONMENTS

Brocade Ethernet switch stacking technology makes it possible to stack up to 12 Brocade ICX 7450 Switches together into a single logical switch using two standard QSFP+ stacking ports. This allows the Brocade ICX 7450 to deliver a class-leading 160 Gbps of backplane bandwidth and offer simple and robust expandability for future growth at the network edge (see Figure 1).

A selection of standard QSFP+ copper cables or standard QSFP+ optics can be used to stack Brocade ICX 7450 Switches together, enabling stacking over distance and thereby eliminating the need for stacked switches to be colocated in the same wiring closet. This stacked logical switch also has only a single IP address to simplify management and offers transparent STP-free traffic forwarding and shared Link Aggregation Groups (LAG) across a pool of up to 576 1 GbE ports and 48 10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion.

Brocade stacking technology also delivers high availability, enabling instantaneous hitless failover to a standby stack controller if the master stack controller fails. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network services.

SIMPLIFIED, OPEN STANDARDS-BASED MANAGEMENT AND MONITORING

The Brocade ICX 7450 provides simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

sFlow-based "Always-On" Network Monitoring

sFlow is a modern, standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow hardware support into the Brocade ICX 7450, Brocade delivers an "always-on" technology that operates with wire-speed performance. sFlow dramatically reduces implementation costs compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies. Moreover, sFlow gives organizations full, enterprise-wide monitoring capability for every port in the network.

Simplified, Automated Deployment with Auto-Configuration

The Brocade ICX 7450 supports auto-configuration, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration of the switches without requiring a highly trained network engineer onsite. When the switches power up, they automatically receive an IP address and configuration from DHCP and Trivial File Transport Protocol (TFTP) servers. At this time, the switches can also automatically receive a software update to be at the same code revision as currently installed switches.

Open Standards Management

The Brocade ICX 7450 includes an industry-standard Command Line Interface (CLI) and supports Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the system. In addition, support for Terminal Access Controller Access Control System (TACACS/TACACS+) and RADIUS authentication helps ensure secure operator access.

Figure 1.

Up to 12 Brocade ICX 7450 switches can be stacked together using two full-duplex QSFP+ 40 Gbps ports that provide a fully redundant backplane with 160 Gbps of stacking bandwidth.

Out-of-Band Management

The Brocade ICX 7450 includes a 10/100/1000 Mbps RJ-45 Ethernet port dedicated to out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

SDN-ENABLED PROGRAMMATIC CONTROL OF THE NETWORK

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments and promises breakthrough levels of customization, scale, and efficiency. The Brocade ICX 7450 enables SDN by supporting the OpenFlow 1.3 protocol*, which allows communication between an OpenFlow controller and an OpenFlow-enabled switch. Using this approach, organizations can control their networks programmatically, transforming the network into a platform for innovation through new network applications and services.

The Brocade ICX 7450 delivers OpenFlow in true hybrid port mode, which allows organizations to simultaneously deploy traditional Layer 2/3 forwarding with OpenFlow on the same port. This unique capability provides a pragmatic path to SDN by enabling network administrators to progressively integrate OpenFlow into existing networks, giving them the programmatic control offered by SDN for specific flows while the remaining traffic is forwarded as before. Brocade ICX 7450 hardware support for OpenFlow enables organizations to apply these capabilities at line rate.

UNIFIED WIRED/WIRELESS NETWORK MANAGEMENT WITH BROCADE NETWORK ADVISOR

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and Unified Communications (UC), wireless mobility, and multimedia applications.

To reduce complexity and the time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to groups of IP devices. By using Brocade Network Advisor, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access points, and execute commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor centralizes management of the entire family of Brocade wired products and Aruba wireless products.

ENTEPRISE-CLASS AVAILABILITY

When every second matters, Brocade ICX 7450 switches help deliver continuous availability to optimize the user experience. Brocade stacking technology delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller in the unlikely event of a failure of the master stack controller. Organizations also can use hot-insertion/removal of stack members to avoid interrupting service when adding a switch to increase the capacity of a stack or replacing a switch that needs servicing.

In addition to stack-level high availability, Brocade ICX 7450 Switches include system-level high-availability features, such as dual hot-swappable, load-sharing, and redundant power supplies. The modular design also has dual hot-swappable fan trays. These features provide another level of availability for the campus wiring closet, all in a compact form factor. Additional design features include intake and exhaust temperature sensors and fan spin detection to quickly identify abnormal or failed operating conditions—helping to minimize mean time to repair.

SUPPORT FOR POH TO POWER NEXT-GENERATION EDGE DEVICES

The Brocade ICX 7450 can deliver both power and data across network connections, providing a single-cable solution for the latest edge devices. In addition to supporting the Power over Ethernet (PoE/PoE+) standards, the Brocade ICX 7450 also supports Power over HDBaseT (PoH). This new, high power standard delivers up to 95 watts per port through a standard Ethernet cable, simplifying the wiring of next-generation Ethernet-connected devices such as large HD displays, video surveillance equipment, and VDI thin terminals, enabling data and power to be carried by a single Ethernet wire. The PoE/PoE+ and PoH capabilities reduce the number of required power receptacles and power adapters while increasing reliability and wiring flexibility.

With a 1,500-watt power budget per switch (with two power supplies), the Brocade ICX 7450 24- and 48-port PoE models can supply up to Class 4 PoE+ power (30 watts) to every port and PoH power (95 watts) on eight dedicated ports.

* OpenFlow support to be available in a future software release.

Table 1.

Brocade ICX 7450 models.

Brocade ICX 7450 Product Family	
All Brocade ICX 7450 models offer three modular slots for interchangeable uplink/stacking modules (one in the front, two in the back), dual power supply slots, dual fan trays, one RJ-45 network management port, one mini USB serial management port, and one USB storage port on the front panel.	
Brocade ICX 7450-24 Switch	24×10/100/1000 Mbps RJ-45 ports
Brocade ICX 7450-24P Switch	24×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)
Brocade ICX 7450-48 Switch	48×10/100/1000 Mbps RJ-45 ports
Brocade ICX 7450-48P Switch	48×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)
Brocade ICX 7450-48F Switch	48×100/1000 Mbps SFP ports

Figure 2.

Brocade ICX 7450-48 shown with optional Brocade ICX7400-4X10GC uplink module.

Figure 3.

Brocade ICX 7450-24P shown with optional Brocade ICX7400-1X40GQ QSFP+ uplink module.

Figure 4.

Brocade ICX 7450-48F shown with optional Brocade ICX7400-4X10GF SFP+ uplink module.

Figure 5.

Brocade ICX 7450 rear view shown with two optional Brocade ICX7400-1X40GQ QSFP+ uplink/stacking modules, two AC power supplies, and two fan trays.

FULL LAYER 3 CAPABILITIES

Brocade ICX 7450 Switches offer powerful IPv4 and IPv6 Layer 3 switching capabilities. Organizations can use premium Layer 3 features—such as IPv4/IPv6 OSPF and RIP routing, Policy-Based Routing (PBR), VRRP, and Protocol-Independent Multicast (PIM)—to reduce complexity and enhance the reliability of large enterprise networks by bringing Layer 3 capabilities to the network edge and/or aggregation layer. Advanced Layer 3 capabilities include BGP routing, enabling remote offices to connect Brocade ICX 7450 Switches to service provider networks. Premium and advanced routing capabilities can be added to any Brocade ICX 7450 Switch model through software licensing.

DATA CENTER TOR SWITCH FOR 1 GBE AND 10 GBE SERVER CONNECTIVITY

Thanks to its class-leading 10 GbE and 40 GbE port count, the Brocade ICX 7450 is a great solution as a Top-of-Rack (ToR) switch in a mixed 1 GbE/10 GbE server connectivity environment. It is designed to fit in server racks, consuming only one rack unit and offering dual integrated power supplies and fan assemblies with front-to-back or back-to-front airflow for flexible cooling options. In data center environments where most servers have 1 GbE and some 10 GbE network interfaces, the Brocade ICX 7450 provides a compact and cost-effective 1 GbE/10 GbE ToR switch. In this configuration some of the Brocade ICX 7450 10 GbE or 40 GbE ports can be used to connect to the data center aggregation switches.

Table 2.

Optional port modules for the Brocade ICX 7450.

Brocade ICX 7450 Port Module Options	
Four different optional port modules are offered for the Brocade ICX 7450. These modules are interchangeable and can be installed in any of the three modular slots within the Brocade ICX 7450.*	
Brocade ICX7400-4X1GF Module	4-port 100 Mbps/1 GbE SFP
Brocade ICX7400-4X10GF Module	4-port 1/10 GbE SFP/SFP+
Brocade ICX7400-4X10GC Module	4-port 1/10 GbE 10GBASE-T copper
Brocade ICX7400-1X40GQ Module	1-port 40 GbE QSFP+ for uplink or stacking

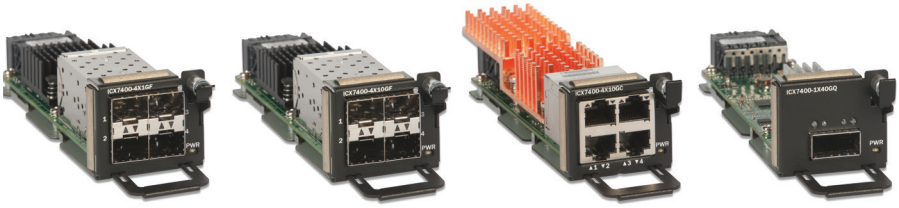


Figure 6.

Four different optional port modules are offered for the Brocade ICX 7450 with a choice of 1 GbE SFP, 10 GbE SFP/SFP+, 10GBASE-T, and 40 GbE QSFP+ options.

Table 3.

Power supply options for the Brocade ICX 7450.

Brocade ICX 7450 Power Supply Options	
The Brocade ICX 7450 offers a selection of PoE/non-PoE and AC/DC power supply options with front-to-back or back-to-front airflow cooling options. The DC power supply can be installed in either PoE or no-PoE switches.	
RPS15-E power supply	Non-PoE 250 W AC with power-supply-side exhaust airflow
RPS15-I power supply	Non-PoE 250 W AC with power-supply-side intake airflow
RPS16-E power supply	PoE 1,000 W AC with power-supply-side exhaust airflow
RPS16-I power supply	PoE 1,000 W AC with power-supply-side intake airflow
RPS16DC-E power supply	PoE 510 W DC with power-supply-side exhaust airflow
RPS16DC-I power supply	PoE 510 W DC with power-supply-side intake airflow

Figure 7.

The Brocade ICX 7450 offers a choice of 250 W AC, 1,000 W AC, or 510 W DC power supply options. All power supplies are available with front-to-back or back-to-front airflow.

WARRANTY

The Brocade ICX 7450 Switch is covered by the Brocade Assurance® Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

MAXIMUM OPERATIONAL EFFICIENCY AND INVESTMENT PROTECTION

To further improve operational efficiency, Brocade ICX 7450 Switches come with 90 days of free technical support from the Brocade Technical Assistance Center and free software updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

AFFORDABLE ACQUISITION OPTIONS

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/CapitalSolutions.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

* The Brocade ICX7400-1X40GQ module cannot be installed in the front-facing slot of the 48-port Brocade ICX 7450 models (Brocade ICX 7450-48, 7450-48P, 7450-48F). The Brocade ICX7400-4X1GF module cannot be installed in the rear slots of any model of the Brocade ICX 7450 Switch.

BROCADE ICX 7450 FEATURE/MODEL COMPARISON

	24 or 48 RJ-45 Ports		48 SFP Ports	24 or 48 PoE+ Ports	
	Brocade ICX 7450-24	**Brocade ICX 7450-48**	**Brocade ICX 7450-48F**	**Brocade ICX 7450-24P**	**Brocade ICX 7450-48P**
Switching capacity *(data rate, full duplex)*	288 Gbps	336 Gbps	336 Gbps	288 Gbps	336 Gbps
Forwarding capacity *(data rate, full duplex)*	214 Mpps	250 Mpps	250 Mpps	214 Mpps	250 Mpps
Fixed ports: 10/100/1000 Mbps RJ45	24	48		24	48
Fixed ports: 100/1000 Mbps SFP			48		
Modular slots	3	3	3	3	3
Modular ports: 1 GbE SFP (max.)	4	4	4	4	4
Modular ports: 1/10 GbE SFP/SFP+ (max.)	12	12	12	12	12
Modular ports: 1/10GBASE-T RJ45 (max.)	12	12	12	12	12
Modular ports: 40 GbE QSFP+ (max.)	3	2	2	3	2
Maximum PoE Class 3 ports *(AC power supplies)*				24 (1 AC PSU)	48 (1 AC PSU)
Maximum PoE+ ports *(AC power supplies)*				24 (1 AC PSU)	48 (2 AC PSU)
Maximum PoH ports *(AC power supplies)*				8 (1 AC PSU)	8 (1 AC PSU)
Advanced IPv4/v6 L3 routing *(RIP, OSPF, BGP)*	With license	With license	With license	With license	With license
Stacking bandwidth *(data rate, full duplex)*	160 Gbps	160 Gbps	160 Gbps	160 Gbps	160 Gbps
Stacking density *(maximum switches in a stack)*	12	12	12	12	12
Maximum stacking distance *(distance between stacked switches)*	100 m	100 m	100 m	100 m	100 m
Power					
Power inlet (AC)	C14				
Input voltage / frequency	AC: 100 to 240 VAC @ 50 to 60 Hz | DC: 40 to 60 VDC				
Power supply rated maximum (AC)	2×250 W	2×250 W	2×250 W	2×1,000 W	2×1,000 W
Power supply rated maximum (DC)	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W
PoE power budget (AC) *(two AC power supplies)*				1,500 W	1,500 W
PoE power budget (DC) *(two DC power supplies)*				516 W	516 W
Switch power utilization† (25°C) ***Idle*** (no PoE load) ***10% traffic***‡ *(full PoE load)* ***100% traffic***‡ *(full PoE load)*	63 W 64 W 69 W	93 W 95 W 100 W	119 W 120 W 123 W	75 W 911 W 916 W	106 W 930 W 935 W
Switch heat dissipation§ (25°C) ***Idle*** *(no PoE load)* ***10% traffic***‡ *(full PoE load)* ***100% traffic***‡ *(full PoE load)*	215 BTU/hr 218 BTU/hr 235 BTU/hr	317 BTU/hr 324 BTU/hr 341 BTU/hr	406 BTU/hr 409 BTU/hr 420 BTU/hr	256 BTU/hr 259 BTU/hr 276 BTU/hr	362 BTU/hr 369 BTU/hr 386 BTU/hr
Environment					
Weight	6.4 kg (13.95 lb)	6.6 kg (14.55 lb)	6.8 kg (14.99 lb)	6.9 kg (15.21 lb)	7.2 kg (15.87 lb)
Dimensions	440 mm (17.323 in.) W × 393.7 mm (15.5 in.) D × 43.7 mm (1.720 in.) H; 1U				
Acoustics	46 dBA	47 dBA	46 dBA	49 dBA	49 dBA
MTBF	399,973 hours	376,635 hours	330,154 hours	317,719 hours	297,862 hours

† Switch includes one AC power supply, one fan, one 4×10 GbE SFP+ uplink module, two QSFP+ stacking modules.

‡ Traffic load on all ports connected with maximum possible PoE/PoE+ loads (if equipped).

§ PoE power not included in switch heat dissipation figures since the heat is not dissipated at the switch.

BROCADE ICX 7450 SPECIFICATIONS

Specifications	
Connector options	• 10/100/1,000 ports: RJ-45 • 100 Mbps SFP ports: 100BASE-FX • 1 Gbps SFP ports: SX, LX, LHA, BXU, BXD • 10 Gbps SFP+ ports: USR, SR, LR, ER, ZR, LRM • 40 Gbps QSFP+ ports: SR4, LR4, direct-attached copper cables for stacking • Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 • Console management: Mini-USB serial port (Mini-B plug) • Storage: USB port (Standard-A plug) For the latest information about supported optics, please visit www.brocade.com/Optics.
Maximum MAC addresses	32,000
Maximum VLANs	4,096
Maximum STP (spanning trees)	254
Maximum routes (in hardware)	16,000 (IPv4) 3000 (IPv6)
Trunking	Maximum ports per trunk: 8 Maximum trunk groups: 124
Maximum jumbo frame size	9,216 bytes
QoS priority queues	8 per port
Layer 2 switching	• 802.1s Multiple Spanning Tree • 802.1x Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • MAC-based VLANs, Dynamic MAC-based VLAN activation • Dynamic VLAN Assignment • Dynamic Voice VLAN Assignment • Fast Port Span • GARP VLAN Registration Protocol • IGMP Snooping (v1/v2/v3) • IGMP Proxy for Static Groups • IGMP v2/v3 Fast Leave • IGMP Tracking • Inter-Packet Gap (IPG) adjustment • Link Fault Signaling (LFS) • MAC Address Locking; MAC Port Security • MAC-Layer Filtering • MAC Learning Disable • MLD Snooping (v1/v2) • Multi-device Authentication • Per-VLAN Spanning Tree (PVST/PVST+/PVRST) • Mirroring - Port-based, ACL-based, MAC Filter-based, and VLAN-based • Port Loop Detection • Private VLAN • Protected Link Groups • Protocol VLAN (802.1v), Subnet VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Single-link LACP • Trunk Groups • Uni-Directional Link Detection (UDLD)

BROCADE ICX 7450 SPECIFICATIONS (CONTINUED)

Base Layer 3 IP routing	• IPv4 and IPv6 static routes • ECMP • Port-based Access Control Lists • L3/L4 ACLs • Host routes • Virtual Interfaces • Routed Interfaces • Route-only Support • Routing Between Directly Connected Subnets
Premium Layer 3 IP routing (with software license)	• IPv4 and IPv6 dynamic routes • RIP v1/v2, RIPng (IPv6) • OSPF v2, OSPF v3 (IPv6) • PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) • PBR • Virtual Route Redundancy Protocol (VRRP) • VRRP-E, VRRP-E (IPv6) • VRRPv3 (IPv6) • BGP4, BGP4+(IPv6) • GRE • IPv6 over IPv4 tunnels • VRF (IPv4 and IPv6)
SDN features*	• Support for OpenFlow v1.0 and v1.3 • OpenFlow support with true hybrid port mode • Operates seamlessly under the Brocade Vyatta® Controller
Metro features	• Metro-Ring Protocol (MRP) (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • VLAN Stacking (Q-in-Q) • VRRP • Topology Groups
Quality of Service (QoS)	• ACL Mapping and Marking of ToS/DSCP • ACL Mapping and Marking of 802.1p • ACL Mapping to Priority Queue • ACL Mapping to ToS/DSCP • Classifying and Limiting Flows Based on TCP Flags • DHCP Relay • DiffServ Support • Honoring DSCP and 802.1p • MAC Address Mapping to Priority Queue • Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP

* OpenFlow support to be available in a future software release.

BROCADE ICX 7450 SPECIFICATIONS (CONTINUED)

IEEE standards compliance	• 802.1AB LLDP/LLDP-MED • 802.1D-2004 MAC Bridging • 802.1p Mapping to Priority Queue • 802.1s Multiple Spanning Tree • 802.1w Rapid Spanning Tree (RSTP) • 802.1x Port-based Network Access Control • 802.3 10Base-T • 802.3ab 1000Base-T • 802.3ad Link Aggregation (Dynamic and Static) • 802.3ae 10 Gigabit Ethernet • 802.3af Power over Ethernet • 802.3at Power over Ethernet Plus • 802.3u 100Base-TX • 802.3x Flow Control • 802.3z 1000Base-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.3ba 40 Gbps Ethernet • 802.1AE- MACsec (HW Capable) • 802.3az-2010 - EEE (HW Capable) • 802.1Q VLAN Tagging
RFC standards compliance	For a complete list of RFCs supported by the Brocade FastIron® software platform, please visit www.brocade.com/FastIronRFC.
Traffic management	• ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting • Inbound rate limiting per port • Outbound rate limiting per port and per queue
High availability	• Redundant hot-swappable power supplies • Hot-swappable fan trays • L3 VRRP protocol redundancy • Real-time state synchronization across the stack • Hitless failover from master to standby stack controller • Protected link groups • Hot insertion and removal of stacked units

Network and Device Management

Management	• Auto Configuration • Configuration Logging • Digital Optical Monitoring • Display Log Messages on Multiple Terminals • Embedded Web Management • Embedded DHCP Server • Industry-standard Command Line Interface (CLI) • Key-based activation of optional software features • Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows • Brocade Network Advisor • MIB Support for MRP, Port Security, MAC Authentication, and MAC-based VLANs • Out-of-band Ethernet Management • RFC 783 TFTP • RFC 854 TELNET Client and Server • RFC 951 Bootp • RFC 1157 SNMPv1/v2c • RFC 1213 MIB-II • RFC 1493 Bridge MIB • RFC 1516 Repeater MIB • RFC 1573 SNMP MIB II • RFC 1643 Ethernet Interface MIB

BROCADE ICX 7450 SPECIFICATIONS (CONTINUED)

Management (continued)	• RFC 1724 RIP v1/v2 MIB • RFC 1757 RMON MIB • RFC 2068 Embedded HTTP • RFC 2131 DHCP Server and DHCP Relay • RFC 2570 SNMPv3 Intro to Framework • RFC 2571 Architecture for Describing SNMP Framework • RFC 2572 SNMP Message Processing and Dispatching • RFC 2573 SNMPv3 Applications • RFC 2574 SNMPv3 User-based Security Model • RFC 2575 SNMP View-based Access Control Model SNMP • RFC 2818 Embedded HTTPS • RFC 3176 sFlow • SNTP Simple Network Time Protocol • Multiple Syslog Servers
Security	• 802.1X Accounting • MAC Authentication • DHCP snooping • Dynamic ARP inspection • Bi-level Access Mode (Standard and EXEC Level) • EAP pass-through support • IEEE 802.1X username export in sFlow • Protection against Denial of Service (DoS) attacks • Authentication, Authorization, and Accounting (AAA) • Advanced Encryption Standard (AES) with SSHv2 • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Username/Password • Web authentication • Change of Authorization (CoA) RFC 5176 • Flexible authentication

Environment	
Temperature	• Operating temperature: –5°C to 50°C/23°F to 122°F • Storage temperature: –25°C to 70°C/–13°F to 158°F
Humidity	• Operating relative humidity: 5% to 95% at 50°C, non-condensing • Non-operating relative humidity: 0% to 95% at 70°C, non-condensing
Altitude	• Operating altitude: 10,000 ft. (3,000 m) maximum • Storage altitude: 39,000 ft. (12,000 m) maximum

Compliance/Certification	
Electromagnetic emissions	FCC Class A (Part 15); EN 55022/CISPR-22 Class A; VCCI Class A; ICES-003 Electromagnetic Emission; AS/NZS 55022; EN 61000-3-2 Power Line Harmonics; EN 61000-3-3 Voltage Fluctuation and Flicker; EN 61000-6-3 Emission Standard (supersedes: EN 50081-1)
Safety	CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1 Second Edition; IEC 60950-1 Second Edition; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide; EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
Immunity	EN 61000-6-1 Generic Immunity and Susceptibility (supersedes EN 50082-1); EN 55024 Immunity Characteristics (supersedes EN 61000-4-2 ESD); EN 61000-4-3 Radiated, Radio Frequency, Electromagnetic Field; EN 61000-4-4 Electrical Fast Transient; EN 61000-4-5 Surge; EN 61000-4-6 Conducted Disturbances Induced by Radio-Frequency Fields; EN 61000-4-8 Power Frequency Magnetic Field; EN 61000-4-11 Voltage Dips and Sags
Environmental regulatory compliance	RoHS-compliant (6 of 6); WEEE-compliant
Vibration	IEC 68-2-36, IEC 68-2-6
Shock and drop	IEC 68-2-27, IEC 68-2-32

BROCADE ICX 7450 ORDERING INFORMATION

Part Number	Description
Switch Bundles	
ICX7450-24-E	24-port 1 GbE switch bundle with 4×10 GbE SFP+ uplinks, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan with power-supply-side exhaust airflow
ICX7450-24P-E	24-port 1 GbE switch PoE+ bundle, 4×10 GbE SFP+ uplinks, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan with power-supply-side exhaust airflow
ICX7450-48-E	48-port 1 GbE switch bundle, 4×10 GbE SFP+ uplinks, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan with power-supply-side exhaust airflow
ICX7450-48P-E	48-port 1 GbE switch PoE+ bundle, 4×10 GbE SFP+ uplinks, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan with power-supply-side exhaust airflow
ICX7450-48P-STK-E	48-port 1 GbE switch PoE+ bundle, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan with power-supply-side exhaust airflow (stack member with no uplink module)
ICX7450-48F-E	48-port 1 GbE SFP fiber switch bundle, 4×10 GbE SFP+ uplinks, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan with power-supply-side exhaust airflow
Bare Switches	
ICX7450-24	24-port 1 GbE switch, three modular slots for optional uplink/stacking ports. Power supply and fan need to be ordered separately.
ICX7450-24P	24-port 1 GbE switch PoE+, three modular slots for optional uplink/stacking ports. Power supply and fan need to be ordered separately.
ICX7450-48	48-port 1 GbE switch, three modular slots for optional uplink/stacking ports. Power supply and fan need to be ordered separately.
ICX7450-48P	48-port 1 GbE switch PoE+, three modular slots for optional uplink/stacking ports. Power supply and fan need to be ordered separately.
ICX7450-48F	48-port 1 GbE switch SFP, three modular slots for optional uplink/stacking ports. Power supply and fan need to be ordered separately.
Port Modules	
ICX7400-4X1GF	Brocade ICX 7450 4-port 100 Mbps/1 GbE SFP module
ICX7400-4X10GF	Brocade ICX 7450 4-port 1/10 GbE SFP/SFP+ module
ICX7400-4X10GC	Brocade ICX 7450 4-port 1/10 GbE 10GBASE-T copper module
ICX7400-1X40GQ	Brocade ICX 7450 1-port 40 GbE QSFP+ module (for stacking or uplink)
Power Supplies and Fans	
RPS15-E	Brocade ICX 7450/6610 non-PoE 250 W AC power supply with power-supply-side exhaust airflow
RPS15-I	Brocade ICX 7450/6610 non-PoE 250 W AC power supply with power-supply-side intake airflow
RPS16-E	Brocade ICX 7450/6610 PoE 1,000 W AC power supply with power-supply-side exhaust airflow
RPS16-I	Brocade ICX 7450/6610 PoE 1,000 W AC power supply with power-supply-side intake airflow
RPS16DC-E	Brocade ICX 7450/6610 510 W DC power supply with power-supply-side exhaust airflow
RPS16DC-I	Brocade ICX 7450/6610 510 W DC power supply with power-supply-side intake airflow
ICX-FAN10-E	Brocade ICX 7450/6610 power-supply-side exhaust airflow fan
ICX-FAN10-I	Brocade ICX 7450/6610 power-supply-side intake airflow fan
Feature License and Accessories	
ICX7450-PREM-LIC	Brocade ICX 7450 Layer 3 Premium Software License
ICX7000-RMK	FRU, rack mount kit, two post, Brocade ICX 7750/7450
XBR-R000295	FRU, rack mount kit, four post, 24 in. to 32 in. depth rack
BR-NTWADV-IP-BASE	Brocade Network Advisor IP management software license for up to 50 devices; required for initial purchase of IP only management; minimum of one year of support required.
Optics	
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring capable
E1MG-100FX-IR-OM	100BASE-FX IR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 15 km.
E1MG-100FX-LR-OM	100BASE-FX LR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 40 km.
E1MG-TX	1000BASE-TX SFP copper, RJ-45 connector
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable
E1MG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single-strand SMF fiber

BROCADE ICX 7450 ORDERING INFORMATION (CONTINUED)

E1MG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single-strand SMF fiber
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, 1-pack
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), target range 300 m over MMF
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF
10G-SFPP-ER	10GBASE-ER SFP+ optic (LC), for up to 40 km over SMF
10G-SFPP-ZR	10GBASE-ZR SFP+ optic (LC), for up to 80 km over SMF
10G-SFPP-LRM	10GBASE-LRM, 1,310 nm SFP+ optic (LC), TAR
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF, 1-pack
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF, 1-pack
Direct-Attached Cables	
40G-QSFP-C-00501	40 GbE QSFP+ direct-attached copper cable, 0.5 m, 1-pack, passive
40G-QSFP-C-00508	40 GbE QSFP+ direct-attached copper cable, 0.5 m, 8-pack, passive
40G-QSFP-C-0101	40 GbE QSFP+ direct-attached copper cable, 1 m, 1-pack, passive
40G-QSFP-QSFP-C-0101	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 1 m, 1-pack
40G-QSFP-QSFP-C-0301	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 3 m, 1-pack
40G-QSFP-QSFP-C-0501	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 5 m, 1-pack
10G-SFPP-TWX-0101	Direct-attached SFP+ copper cable, 1 m, 1-pack, active
10G-SFPP-TWX-0301	Direct-attached SFP+ copper cable, 3 m, 1-pack, active
10G-SFPP-TWX-0501	Direct-attached SFP+ copper cable, 5 m, 1-pack, active

Ordering Instructions

Customers have two options when ordering a Brocade ICX 7450 Switch. They can select one of the six pre-built units from the "Switch Bundles" section, or they can build their own custom unit by selecting a “Bare Switch” and adding their choice of power supplies, fans, and port modules.

Pre-built units ordered from the "Switch Bundles" section include a power cord, two-post rack mounting brackets, and a USB serial console cable. Units ordered from the "Bare Switches”section include two-post rack mounting brackets and a USB serial console cable. AC power supplies ordered separately include a power cord. Stacking cables must be ordered separately.

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BROCADE ICX 6430 AND 6450 SWITCHES

ENTERPRISE LAN SWITCHING

Enterprise-Class Stackable Switching at an Entry-Level Price

HIGHLIGHTS

- Offers enterprise-class stackable switching at an entry-level price, allowing organizations to buy what they need now and easily scale as demand grows and new technologies emerge
- Delivers unprecedented feature/price value for enterprise applications, including Unified Communications (UC) and mobility, with 10 Gigabit Ethernet (GbE) and PoE/PoE+
- Provides unmatched availability for low-cost switching with redundant uplink/stacking ports, hitless stacking failover, and configurable power redundancy
- Simplifies network operations and protects investments with the Brocade HyperEdge Architecture, enabling consolidated network management and advanced services-sharing across heterogeneous switches
- Offers attractive 12-port, compact, and enterprise-class fanless switch models for deployments outside of the wiring closet
- Includes the Brocade Assurance Limited Lifetime Warranty and three years of technical support

Today's organizations expect their enterprise campus LANs to deliver more services to more users at a lower cost. These services include next-generation business applications as well as anytime, anywhere access for mobile devices. At the same time, campus LANs must be able to scale easily to meet future demands and efficiently evolve within dynamic business environments.

Brocade® ICX® 6430 and 6450 Switches provide enterprise-class stackable LAN switching solutions to meet the growing demands of campus networks. Designed for small to medium-size enterprises, branch offices, and distributed campuses, these intelligent, scalable edge switches deliver enterprise-class functionality at an affordable price—without compromising performance and reliability. The Brocade ICX 6430 and 6450 are available in 12-, 24-, and 48-port 10/100/1000 Mbps models and 1 Gigabit Ethernet (GbE) or 10 GbE dual-purpose uplink/stacking ports (see Figures 1 and 2)—with or without IEEE 802.3af Power over Ethernet (PoE) and 802.3at Power over Ethernet Plus (PoE+)—to support enterprise edge networking, wireless mobility, and IP communications.

BUILT FOR MAXIMUM COST-EFFICIENCY AND INVESTMENT PROTECTION

With Brocade ICX 6430 and 6450 Switches, organizations can buy only what they need today and easily scale user ports and services as their network requirements evolve. Brocade offers maximum investment protection through flexible software licensing options that bring advanced services and performance to lower-cost ports.

BROCADE

In particular, the Brocade HyperEdge™ Architecture allows premium switch features and services to be shared with entry-level switches (Brocade ICX 6450 only). The Brocade ICX switches also are hardware-capable for easy software implementation (software available in a future release) of emerging security (IEEE 802.1AE MACsec) and energy savings (IEEE 802.3az EEE) standards, helping to protect today's investments while supporting tomorrow's needs.

Brocade ICX 6430 and 6450 Switches come with three years of technical support from the Brocade Technical Assistance Center and software maintenance updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

AUTOMATED DEPLOYMENT AND MANAGEMENT

Brocade ICX 6430 and 6450 Switches help simplify network deployment and management by enabling auto-discovery of new Brocade ICX switches within the stack. IT organizations can auto-configure switches using pre-set instructions on the network. To further simplify management, these stacked switches collectively utilize only a single IP address and offer transparent forwarding across the stack.

By embedding sFlow capabilities into the Brocade ICX 6450, Brocade delivers an "always-on" monitoring technology that operates with wire-speed performance. sFlow dramatically reduces implementation complexity compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies.

HIGH AVAILABILITY AND RESILIENCY

Brocade Ethernet switch stacking technology helps IT organizations meet growing user demand by delivering high availability through real-time state synchronization across the stack and instantaneous hitless failover support. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network service when adding or replacing a switch. High-performance Link Aggregation Groups (LAGs) increase 10 GbE uplink bandwidth and redundancy to the core, giving users uninterrupted high performance to support the most demanding applications. Brocade ICX 6430 and 6450 Switches also offer an external power supply for added resiliency and increased PoE/PoE+ port availability (see Figure 3).

STACKING TECHNOLOGY FOR THE MOST DEMANDING CAMPUS LAN ENVIRONMENTS

Brocade Ethernet switch stacking technology makes it possible to stack up to eight Brocade ICX 6450 Switches into a single logical switch (except the Brocade ICX 6450-C), providing simple and robust expandability for future growth at the network edge. This stacked switch has only a single IP address to simplify management and offers transparent forwarding across a pool of up to 384 1 GbE ports and 32 10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion. Flexible licensing of 1 GbE to 10 GbE ports for uplink and stacking allows organizations to optimize network performance based on specific requirements. Brocade stacking technology also delivers high availability, enabling instantaneous hitless failover to a standby stack controller if the master stack controller fails. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network services.

For networks with lower bandwidth requirements, the Brocade ICX 6430 offers the same rugged stacking capability (except the Brocade ICX 6430-C) at a reduced price, providing a lower-density solution of up to 192 1 GbE access ports with 16 1 GbE uplink and stacking ports, and a maximum stack height of four switches.

Built to Power Next-Generation Edge Devices

The Brocade ICX 6430 and 6450 can deliver both PoE power and data across network connections, providing a single-cable solution for the latest edge devices (see Figure 4). Brocade ICX switches are compatible with industry-standard Voice over IP (VoIP) equipment as well as legacy IP phones. In addition, they support the PoE+ standard (IEEE 802.3at) to provide up to Class 4 (30 watts) power to each device. This high-powered solution simplifies wiring for next-generation edge devices, such as video conferencing and VoIP phones, surveillance cameras, and 802.11n wireless Access Points (APs). The PoE capability reduces the number of power receptacles and power adapters while increasing reliability and wiring flexibility. The Brocade ICX 6450 can provide PoE power to all ports and PoE+ (30 watts) to all ports when an external power supply is deployed.

Figure 1.

Brocade ICX 6450 Switches support four dual-mode 1 GbE/10 GbE SFP/SFP+ ports for uplink and stacking, and up to 48 1 GbE RJ-45 ports. Brocade ICX 6430-24 and 6430-48 Switches support four 1 GbE SFP ports for uplink and stacking to provide a cost-optimized solution for lower-traffic networks.

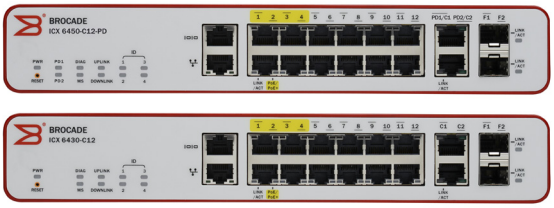

Figure 2.

The Brocade ICX 6430-C and ICX 6450-C Compact Switches support two 1 GbE RJ-45 and two 1 GbE SFP ports for uplink and 12 1 GbE RJ-45 ports with four PoE/PoE+ capable ports in a compact and fanless design—ideal for deployment outside the wiring closet. The ICX 6450-C can be powered either from its internal power supply or with POE/PoE+, through its two RJ45 uplink ports enabling the switch to be deployed in environments where no AC power outlet is present.

Plug-and-Play Operations for Powered Devices

Brocade ICX switches support the IEEE 802.1AB Link Layer Discovery Protocol (LLDP) and ANSI TIA 1057 Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) standards that enable organizations to deploy interoperable multivendor solutions for Unified Communications (UC). Configuring IP endpoints such as VoIP phones can be a complex task, requiring manual and time-consuming configuration. LLDP and LLDP-MED provide a standard, open method for configuring, discovering, and managing network infrastructure.

The LLDP protocols also reduce operational costs by simplifying and automating network operations. For example, LLDP-MED provides an open protocol for configuring Quality of Service (QoS), security policies, Virtual LAN (VLAN) assignments, PoE power levels, and service priorities.

Compact Switch Solution for Deployment Outside the Wiring Closet

The Brocade ICX 6430-C/6450-C Compact Switch offers enterprise-class LAN switching capabilities, performance, reliability, security, and manageability in a small form factor with fanless operation for deployment outside the wiring closet. It is ideal for deployment in classrooms, retail locations, factories, small offices, workgroup, and space-constrained environments. The Brocade ICX 6430-C/6450-C is available in a 12-port 10/100/1000 Mbps model with IEEE 802.3af PoE and 802.3at PoE+ support on four ports plus four additional 1 GbE uplink ports. Additionally, the Brocade ICX 6450-C can be powered either from its internal AC power supply or with POE/PoE+ power, coming from one or both of its two RJ45 uplink ports, providing increased deployment flexibility by enabling the switch to be deployed in areas where no AC power outlet is present.

In the enterprise, the Brocade ICX 6430-C/6450-C Compact Switch can be used to extend the reach of the network outside the wiring closet, bringing connectivity to more users and supporting additional wireless AP deployment without running more wires. Additionally, the Brocade ICX 6450-C offers L3 routing and GRE support enabling secure and flexible deployment in remote areas. To simplify deployment in-situ, the Brocade ICX 6430-C/6450-C offer flexible mounting options, such as wall brackets and a magnetic mount kit.

Figure 3.

The optional Brocade ICX 6400-EPS1500 is an external power supply source to provide additional power to the Brocade ICX switches (except the Brocade ICX 6430-C/6450-C and 6430-24). It also can be used for system power redundancy and increased PoE/PoE+ power budget to enable additional PoE/PoE+ ports. Each Brocade ICX 6400-EPS1500 can connect up to three Brocade ICX 6430 and 6450 Switches.

BROCADE HYPEREDGE ARCHITECTURE

The Brocade HyperEdge Architecture brings campus networks into the modern era to better support mobility, security, and application agility. This evolutionary architecture integrates innovative wired and wireless technologies to streamline application deployment, simplify network management, and reduce operating costs.

The HyperEdge Architecture enables organizations to build networks that are:

- **Agile:** By eliminating Spanning Tree Protocol (STP) between HyperEdge Domain switches through a flatter Layer 2 design, the HyperEdge Architecture increases link utilization and reduces application deployment complexity. The Distributed AP Forwarding functionality of Brocade wireless Access Points (APs) efficiently secures and directs mobile traffic at the network edge without tunneling data back to a central controller at the network core.
- **Automated:** By grouping premium and entry-level switches with intelligent wireless APs into a consolidated management domain, HyperEdge Domain switches eliminate the need to provision and manage devices individually—simplifying network deployment and management.
- **Cost-effective:** The HyperEdge Architecture enables the propagation of advanced features and services from premium switches to entry-level switches, allowing IT organizations to purchase only what they need today and add intelligent services as the business evolves. Further cost savings are achieved with Brocade wireless solutions using controller-less or controller-shared license deployment options.

Cost-Optimized Cooling Options

The Brocade ICX 6430 48-port and Brocade ICX 6450 24- and 48-port switches offer industry-standard side-to-back airflow with quiet fans at less than 40 dB (except the Brocade ICX 6450-48P). The Brocade ICX 6430-C/6450-C and 6430-24 Switches are available in a fanless configuration, helping to minimize sound and costs for deployments where users are present, such as classrooms and open office environments.

Basic Layer 3 Capabilities

Brocade ICX 6450/6450-C Switches offer an upgrade option to bring Layer 3 capabilities to the network edge, reducing complexity, and enhancing the reliability of enterprise networks.

Data Center ToR Server Connectivity

The Brocade ICX 6430 and 6450 are designed to fit in server racks by consuming only one rack unit. In data center environments where most servers are 1 GbE-capable, the Brocade ICX 6430 and 6450 provide a compact and cost-effective 1 GbE Top-of-Rack (ToR) switch by simply connecting the 1 GbE Network Interface Cards (NICs) in the servers to the Brocade ICX 6430 and 6450 1 GbE ports (see Figure 5). This configuration uses 10 GbE links (Brocade ICX 6450) or 1 GbE links (Brocade ICX 6430) to connect to Brocade ICX data center aggregation switches.

SIMPLIFIED, SECURE STANDARDS-BASED MANAGEMENT AND MONITORING

Brocade ICX 6430 and 6450 Switches provide simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

sFlow-based "Always-On" Network Monitoring

sFlow is a standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow into the Brocade ICX 6450/6450-C Switches, Brocade delivers an "always-on" technology that operates with wire-speed performance. sFlow dramatically reduces implementation costs compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies. Moreover, sFlow gives organizations a full, enterprise-wide monitoring capability for every port in the network.

Simplified Deployment with Auto-Configuration

Brocade ICX 6430 and 6450 Switches support auto-configuration, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration without requiring a highly trained network engineer onsite. When the switches power up, they automatically receive an IP address and configuration from DHCP and Trivial File Transport Protocol (TFTP) servers. At this time, the switches can also automatically receive a software update to be at the same code revision as currently installed switches.

Open-Standards Management

Brocade ICX 6430 and 6450 Switches include an industry-standard Command Line Interface (CLI) and support Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the system. In addition, support for Terminal Access Controller Access Control System (TACACS/TACACS+) and RADIUS authentication helps ensure secure operator access. Embedded Web management is also provided through a GUI-based device interface, and organizations can use Brocade Network Advisor to achieve full device and network management visibility.

Out-of-Band Management

Brocade ICX 6430 and 6450 Switches include a 10/100/1000 Mbps RJ-45 Ethernet port dedicated for out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

UNIFIED WIRED/WIRELESS NETWORK MANAGEMENT WITH BROCADE NETWORK ADVISOR

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and Unified Communications (UC), wireless mobility, and multimedia applications.

To reduce complexity and the time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to groups of IP devices. By using the Brocade Network Advisor Device Configuration Manager tool, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access point realms, or execute CLI commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing

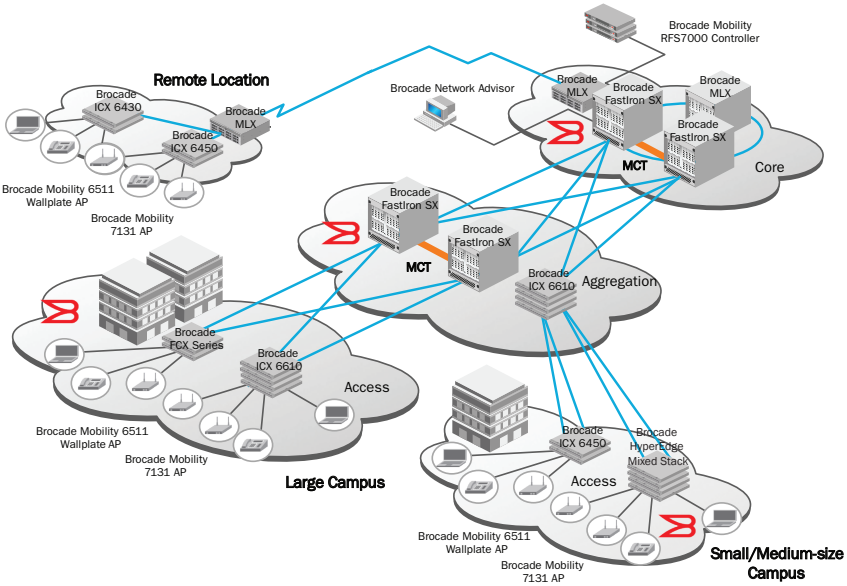

Figure 4.

Brocade ICX 6430 and 6450 Switches are suitable for a wide range of small to medium-size enterprises and branch office deployments at the network access layer.

network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor centralizes management of the entire family of Brocade wired and wireless products, including the Brocade ICX switches.

WARRANTY

Brocade ICX 6430 and 6450 Switches are covered by the Brocade Assurance Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

BEST-IN-CLASS SUPPORT

Brocade ICX 6430 and 6450 Switches are supported by next-business-day advance replacement where available, as well as software defect repairs and maintenance updates. In an effort to further improve service levels and operational efficiency, Brocade includes three years of technical support for Brocade ICX 6430 and 6450 Switches, providing direct access to the Brocade Technical Assistance Center during normal 8×5 business hours.

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

CLOUD-OPTIMIZED NETWORK ACQUISITION

Brocade helps organizations easily address their information technology requirements by offering flexible network acquisition and support alternatives to meet their financial needs. Organizations can select from purchase, lease, and Brocade Network Subscription options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/CapitalSolutions.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

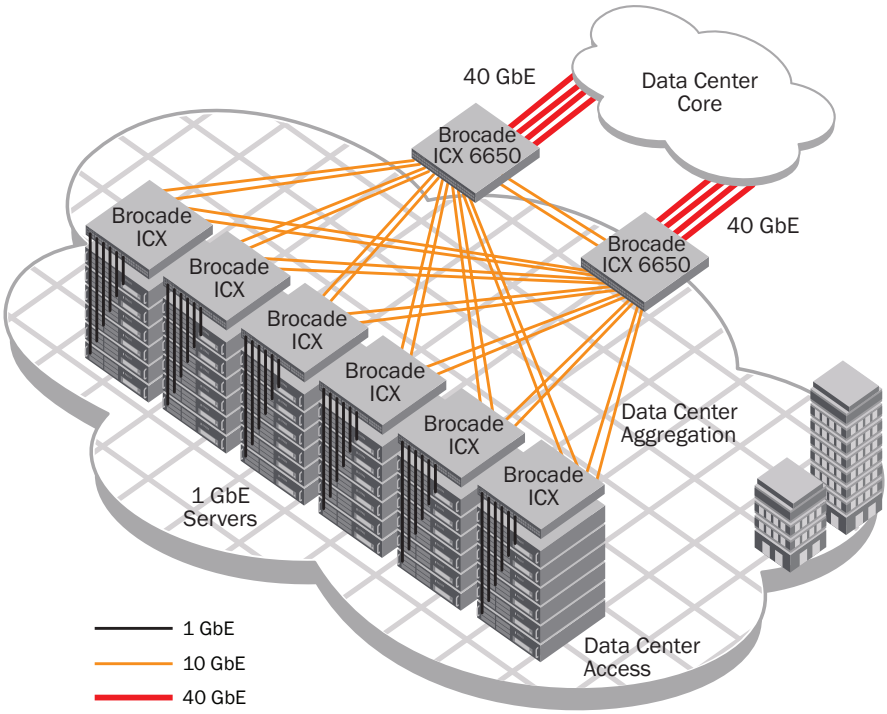

Figure 5.

Brocade ICX 6430 and 6450 Switches provide ToR access while Brocade ICX 6650 Switches provide data center aggregation.

BROCADE ICX 6430/6450 FEATURE AND MODEL SPECIFICATIONS

	Brocade ICX 6430					Brocade ICX 6450				
	6430-C12	**6430-24**	**6430-24P**	**6430-48**	**6430-48P**	**6450-C12-PD**	**6450-24**	**6450-24P**	**6450-48**	**6450-48P**
10/100/1000 Mbps RJ-45 ports	12	24	24	48	48	12	24	24	48	48
10/100/1000 Mbps RJ-45 uplink ports	2					2				
1 GbE SFP ports (uplink/stacking)	2*	4	4	4	4	2*				
1/10 GbE SFP/SFP+ ports (uplink/stacking)							4 (Optional 2-port license)	4 (Optional 2-port license)	4 (Optional 2-port license)	4 (Optional 2-port license)
Stacking bandwidth (data rate, full duplex)		4 Gbps	4 Gbps	4 Gbps	4 Gbps		40 Gbps	40 Gbps	40 Gbps	40 Gbps
Units per stack		4	4	4	4		8	8	8	8
Internal AC power supply rating	100 W	36 W	525 W	65 W	525 W	100 W	65 W	525 W	100 W	880 W
External power supply (redundant power and PoE power)			Optional 525 W	Optional 525 W	Optional 525 W		Optional 525 W	Optional 525 W	Optional 525 W	Optional 525 W × 2
PoE/PoE+ power budget (internal power supply)	68 W		390 W		390 W	68 W		390 W		780 W
PoE Class 3 ports (internal power supply)	4		24		24	4		24		48
PoE+ ports (internal power supply)	2		12		12	2		12		24
Max PoE Class 3 ports (with internal and external power supplies)	4		24		48	4		24		48
Max PoE+ ports (with internal and external power supplies)	2		24		24	2		24		48
PoE/PoE+ powered (Powered Device PD)						Yes				
Base software	Layer 2	Layer 2	Layer 2	Layer 2	Layer 2	Layer 3 with static routes	Layer 3 with static routes	Layer 3 with static routes	Layer 3 with static routes	Layer 3 with static routes
Layer 3 routing (RIP, OSPF)						Optional	Optional	Optional	Optional	Optional
Switching capacity (data rate, full duplex)	32 Gbps	56 Gbps	56 Gbps	104 Gbps	104 Gbps	32 Gbps	128 Gbps	128 Gbps	176 Gbps	176 Gbps
Forwarding capacity (data rate, full duplex)	24 Mpps	42 Mpps	42 Mpps	77 Mpps	77 Mpps	24 Mpps	96 Mpps	96 Mpps	132 Mpps	132 Mpps

** Stacking is not supported on the Brocade 6430-C12/6450-C12-PD. 100Base-FX is supported on the Brocade ICX 6430-C12/6450-C12-PD.*

BROCADE ICX 6430/6450 SPECIFICATIONS

System Architecture	
Connector options	10/100/1000 Mbps ports: RJ-45 Brocade ICX 6430: 1 Gbps SFP ports for uplink/stacking: SX, LX, TX, LHA, LHB, direct-attached copper cable (Twinax) for stacking Brocade 6430-C/6450-C: 100 Mbps/1 Gbps SFP ports for uplink: FX, SX, LX, TX, LHA, LHB; 10/100/1000 Mbps RJ-45 ports for uplink Brocade ICX 6450: 1/10 Gbps SFP+ ports for uplink/stacking: USR, SR, LR, ER, LRM, direct-attached copper cable (Twinax) for stacking Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 Console management: RJ-45 serial External power connector: Redundant system power supply and extended PoE power supply (except the Brocade ICX 6430-24/6430-C12/6450-C12-PD)
Maximum MAC addresses	Brocade ICX 6430, 6430-C: 8000 Brocade ICX 6450, 6450-C: 16,000
Maximum VLANs	Brocade ICX 6430-C: 1024 Brocade ICX 6430, 6450, 6450-C: 4096
Maximum STP (spanning trees)	Brocade ICX 6430, 6430-C: 32 Brocade ICX 6450, 6450-C: 253
Maximum routes (in hardware)	Brocade ICX 6450, 6450-C: 12,000 (IPv4) Brocade ICX 6450, 6450-C: 1070 (IPv6)
Trunking	Brocade ICX 6430 Maximum ports per trunk: 8 Maximum trunk groups: 29 Brocade ICX 6430-C Maximum ports per trunk: 8 Maximum trunk groups: 16 Brocade ICX 6450, 6450-C Maximum ports per trunk: 8 Maximum trunk groups: 124
Priority queues	Brocade ICX 6430, 6430-C: 4 Brocade ICX 6450, 6450-C: 8
Maximum jumbo frame size	9216 bytes
Layer 2 switching	• 802.1s Multiple Spanning Tree • 802.1X Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • MAC-based VLANs, Dynamic MAC-based VLAN activation • Dynamic VLAN Assignment • Dynamic Voice VLAN Assignment • Fast Port Span • GARP VLAN Registration Protocol • IGMP Snooping (v1/v2/v3) • IGMP Proxy for Static Groups • IGMP v2/v3 Fast Leave • IGMP Tracking • Inter-Packet Gap (IPG) adjustment • Link Fault Signaling (LFS) • MAC Address Locking, MAC Port Security • MAC-Layer Filtering, Filtering on source and destination MAC address
Layer 2 switching (continued)	• MAC Learning Disable • MLD Snooping (v1/v2) • Multi-device Authentication • Per-VLAN Spanning Tree (PVST/PVST+/PVRST) • Mirroring: Port-based, ACL-based, MAC Filter-based, and VLAN-based • Port Loop Detection • Private VLAN • Protected Link Groups • Protocol VLAN (802.1v), Subnet VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Single-link LACP • Trunk Groups • Uni-Directional Link Detection (UDLD)
IPv6 support	• Host functionality management • Hardware support for IPv6 • IPv6 static routing (Brocade ICX 6450/6450-C only)
Base Layer 3 routing (Brocade ICX 6450/6450-C)	• IPv4 and IPv6 Static Routes • Port-based Access Control Lists • Host Routes • Virtual Interfaces, up to 255 virtual interfaces • Routed Interfaces • Route-only Support • IP helper • Routing Between Directly Connected Subnets • ECMP • Layer 3/Layer 4 ACLs
Premium Layer 3 routing (Brocade ICX 6450/6450-C)	• OSPF v2 • RIP v1/v2 • Virtual Route Redundancy Protocol (VRRP) • VRRP-E • GRE
Metro features (except the Brocade ICX 6430-C/6450-C)	• Metro-Ring Protocol MRP (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • VLAN Stacking (Q-in-Q) • VRRP • Topology Groups

Quality of Service (QoS)	• ACL Mapping and Marking of ToS/DSCP • ACL Mapping and Marking of 802.1p • ACL Mapping to Priority Queue • ACL Mapping to ToS/DSCP • Classifying and Limiting Flows Based on TCP Flags • DHCP Relay • DiffServ Support • Honoring DSCP and 802.1p • MAC Address Mapping to Priority Queue • Priority Queue Management using Weighted Round Robin (WRR), • Strict Priority (SP), and a combination of WRR and SP
IEEE standards compliance	• 802.1AB LLDP/LLDP-MED • 802.1D-2004 MAC Bridging • 802.1p Mapping to Priority Queue • 802.1Q with Tagging • 802.1s Multiple Spanning Tree • 802.1w Rapid Spanning Tree (RSTP) • 802.1X Port-based Network Access Control • 802.3 10BASE-T • 802.3ab 1000BASE-T • 802.3ad Link Aggregation (Dynamic and Static) • 802.3ae 10 Gigabit Ethernet • 802.3af Power over Ethernet • 802.3at Power over Ethernet Plus • 802.3u 100BASE-TX • 802.3x Flow Control • 802.3z 1000BASE-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.1AE- MACsec (HW-capable): Brocade ICX 6450/6450-C only • 802.3az-2010 - EEE (HW-capable)
Traffic management	• ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting • Inbound rate limiting per port • Outbound rate limiting per port and per queue
High availability	• Redundant external power supply • Layer 3 VRRP protocol redundancy • Real-time state synchronization across the stack • Hitless failover from master to standby stack controller • Protected link groups • Hot insertion and removal of stacked units

Management	
Management and control	• Auto Configuration • Brocade HyperEdge technology (Brocade ICX 6450 only) • Configuration Logging • Digital Optical Monitoring (DOM) • Display Log Messages on Multiple Terminals • Embedded Web Management • Embedded DHCP Server • Industry-standard Command Line Interface (CLI) • Key-based activation of optional software features • Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows • Brocade Network Advisor support • MIB Support for MRP, Port Security, MAC Authentication, MAC-based VLANs • Out-of-band Ethernet Management • RFC 783 TFTP • RFC 854 TELNET Client and Server • RFC 951 Bootp • RFC 1157 SNMPv1/v2c • RFC 1213 MIB-II • RFC 1493 Bridge MIB • RFC 1516 Repeater MIB • RFC 1573 SNMP MIB II • RFC 1643 Ethernet Interface MIB • RFC 1643 Ethernet MIB • RFC 1724 RIP v1/v2 MIB • RFC 1757 RMON MIB • RFC 2068 Embedded HTTP • RFC 2131 DHCP Server and DHCP Relay • RFC 2570 SNMPv3 Intro to Framework • RFC 2571 Architecture for Describing SNMP Framework • RFC 2572 SNMP Message Processing and Dispatching • RFC 2573 SNMPv3 Applications • RFC 2574 SNMPv3 User-based Security Model • RFC 2575 SNMP View-based Access Control Model SNMP • RFC 2818 Embedded HTTPS • RFC 3176 sFlow (Brocade ICX 6450/6450-C only) • SNTP Simple Network Time Protocol • Multiple Syslog Servers
Embedded security	• 802.1X Accounting • MAC authentication • DHCP snooping • Dynamic ARP inspection • Bi-level Access Mode (Standard and EXEC Level) • EAP pass-through support • Packet filtering on TCP Flags • IEEE 802.1X username export in sFlow • Protection against Denial of Service (DoS) attacks

Secure management	• Authentication, Authorization, and Accounting (AAA) • Advanced Encryption Standard (AES) with SSHv2 • Bi-level Access Mode (Standard and EXEC Level) • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Username/password • Web authentication

Physical Specifications

Dimensions	• Brocade ICX 6430-C12/6450-C12-PD models: 1.7 in. (H) × 10.6 in. (W) × 8.4 in. (D) 4.34 cm (H) × 26.92 cm (W) × 21.33 cm (D) • All 24-port models: 1.7 in. (H) × 17.44 in. (W) × 9.45 in. (D) 4.34 cm (H) × 44.3 cm (W) × 24 cm (D) • All 48-port models: 1.7 in. (H) × 17.44 in. (W) × 14.57 in. (D) 4.34 cm (H) × 44.3 cm (W) × 37 cm (D) • ICX6400-EPS1500: 1.7 in. (H) × 17.44 in. (W) × 14.57 in. (D) 4.34 cm (H) × 44.3 cm (W) × 37 cm (D)
Weight	• Brocade ICX 6430-C12: 4 lb (1.81 kg) • Brocade ICX 6430-24: 7.58 lb (3.44 kg) • Brocade ICX 6430-24P: 10.08 lb (4.57 kg) • Brocade ICX 6430-48: 11.09 lb (5.03 kg) • Brocade ICX 6430-48P: 13.8 lb (6.26 kg) • Brocade ICX 6450-C12-PD: 4.62 lb (2.09 kg) • Brocade ICX 6450-24: 7.39 lb (3.35 kg) • Brocade ICX 6450-24P: 10.03 lb (4.55 kg) • Brocade ICX 6450-48: 11.07 lb (5.02 kg) • Brocade ICX 6450-48P: 14.11 lb (6.4 kg) • Brocade ICX 6400-EPS1500: 14.85 lb (6.75 kg)

Environment

Temperature	• Operating temperature: 0°C to 45°C (32°F to 113°F) • Operating temperature for Brocade ICX 6430-C12: 0°C to 40°C (32°F to 104°F) • Storage temperature: -40°C to 70°C (-40°F to 158°F)
Humidity	• Operating relative humidity: 5% to 95%, non-condensing • Non-operating relative humidity: 0% to 95%, non-condensing
Storage altitude	• 10,000 ft (3000 m) maximum
Acoustic (25°C)	• Brocade ICX 6430-C12: Fanless (ambient) • Brocade ICX 6430-24: Fanless (ambient) • Brocade ICX 6430-24P: 39.2 dBA • Brocade ICX 6430-48: 37.2 dBA • Brocade ICX 6430-48P: 39.3 dBA • Brocade ICX 6450-C12-PD: Fanless (ambient) • Brocade ICX 6450-24: 37.9 dBA • Brocade ICX 6450-24P: 39.2 dBA • Brocade ICX 6450-48: 37.2 dBA • Brocade ICX 6450-48P: 55.5 dBA • Brocade ICX 6400-EPS1500: 60.9 dBA
Vibration	• IEC 68-2-36, IEC 68-2-6
Shock and drop	• IEC 68-2-27 • IEC 68-2-32
MTBF (25°C, CL: 60%)	• Brocade ICX 6430-C12: 1,124,442 hours • Brocade ICX 6430-24: 1,229,732 hours • Brocade ICX 6430-24P: 505,469 hours • Brocade ICX 6430-48: 748,262 hours • Brocade ICX 6430-48P: 384,288 hours • Brocade ICX 6450-C12-PD: 868,732 hours • Brocade ICX 6450-24: 906,243 hours • Brocade ICX 6450-24P: 485,749 hours • Brocade ICX 6450-48: 756,081 hours • Brocade ICX 6450-48P: 397,590 hours • Brocade ICX 6400-EPS1500: 789,923 hours

Power

Power supplies	• Integrated AC power supply for system and PoE power • External 1500 W AC power supply for redundant system power and extended PoE power
Power inlet (Max current rating at 100 V input)	• Brocade ICX 6430-C12: 1.8 Amp • Brocade ICX 6430-24: 0.9 Amp • Brocade ICX 6430-24P: 6 Amp • Brocade ICX 6430-48: 1.5 Amp • Brocade ICX 6430-48P: 6 Amp • Brocade ICX 6450-C12-PD: 1.8 Amp • Brocade ICX 6450-24: 1.5 Amp • Brocade ICX 6450-24P: 6 Amp • Brocade ICX 6450-48: 2 Amp • Brocade ICX 6450-48P: 10 Amp • Brocade ICX 6400-EPS1500: 16 Amp
Input voltage	• Universal 100 to 240 VAC
AC power cord current rating	• Brocade ICX 6430-C12/6450-C12-PD: 10 Amp, 100 to 240 V • Brocade ICX 6430 and 6450 switches: 13 Amp, 100 to 240 V • Brocade ICX 6400-EPS1500: 20 Amp, 100 to 240 V
DC power cord current rating	• Brocade ICX 6400-EPS1500: 5.6 Amp at 12 V rail; 6.85 Amp at 54 V rail • Brocade ICX 6400-EPS1500: 3 DC cables included; cable length: 3 feet
Input line frequency	• 50 to 60 Hz
Heat dissipation (no PoE load)	• Brocade ICX 6430-C12: 62 BTU/hr • Brocade ICX 6430-24: 67 BTU/hr • Brocade ICX 6430-24P: 104 BTU/hr • Brocade ICX 6430-48: 128 BTU/hr • Brocade ICX 6430-48P: 132 BTU/hr • Brocade ICX 6450-C12-PD: 68.3 BTU/hr • Brocade ICX 6450-24: 124 BTU/hr • Brocade ICX 6450-24P: 129 BTU/hr • Brocade ICX 6450-48: 186 BTU/hr • Brocade ICX 6450-48P: 192 BTU/hr

Regulatory Compliance and Safety Approvals

Electromagnetic compatibility	• FCC Part 15, Subpart B, Class A • ICES-003: 2004 • VCCI—Technical Requirement (V-3/2011.04)/ Class A • EN 55022: 2006+A1: 2007 Class A • EN 61000-3-2: 2006+A1:2009+A2:2009 Class A • EN 61000-3-3: 2008 • EN 61000-6-1: 2007 • EN 61000-6-3: 2007 • EN 55024: 1998+A1:2001+A2:2003 • EN 300 386 (V1.4.1): 2008 • IEC 61000-4-2: 2008 ED. 2.0 • IEC 61000-4-3: 2006+A1:2007+A2:2010 ED. 3.2 • IEC 61000-4-4: 2004+A1:2010 ED. 2.0 • IEC 61000-4-5: 2005 ED. 2.0 • IEC 61000-4-6: 2008 ED. 3.0 • IEC 61000-4-8: 2009 ED. 2.0 • IEC 61000-4-11: 2004 ED. 2.0
Safety	• CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1 2nd Edition; IEC 60950-1 2nd Edition; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide; EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
Environmental regulatory compliance	• RoHS-compliant (6 of 6); WEEE-compliant

Measured Power Utilization

Models	Idle[1]	5% Throughput[2]	100% Throughput[3]
Brocade ICX 6430-C12	10 W	92.6 W	93 W
Brocade ICX 6430-24	7 W	19 W	20 W
Brocade ICX 6430-24P	9 W	391 W	396 W
Brocade ICX 6430-48	15 W	37 W	38 W
Brocade ICX 6430-48P	16 W	401 W	403 W
Brocade ICX 6450-C12-PD	11.6 W	94.3 W	94.6 W
Brocade ICX 6450-24	20 W	29 W	37 W
Brocade ICX 6450-24P	21 W	395 W	400 W
Brocade ICX 6450-48	30 W	51 W	55 W
Brocade ICX 6450-48P	31 W	771 W	776 W

[1] All ports are disconnected with no PoE load.

[2] 5 percent traffic load on all ports connected with maximum possible PoE loads (if equipped).

[3] 100 percent traffic load on all ports connected with maximum possible PoE loads (if equipped).

BROCADE ICX 6430/6450 ORDERING INFORMATION

Part Number	Description
ICX6430-C12	12-port 1 GbE compact switch (4 PoE+), 2×100 Mbps/1 GbE SFP and 2×100 Mbps/1 GbE copper uplinks, fanless
ICX6430-24	24-port 1 GbE switch, 4×1 GbE SFP uplink/stacking ports, fanless
ICX6430-24P	24-port 1 GbE switch PoE+ 390 W, 4×1 GbE SFP uplink/stacking ports
ICX6430-48	48-port 1 GbE switch, 4×1 GbE SFP uplink/stacking ports
ICX6430-48P	48-port 1 GbE switch PoE+ 390 W, 4×1 GbE SFP uplink/stacking ports
ICX6450-C12-PD	12-port 1 GbE compact switch (4 PoE+), 2×100 Mbps/1 GbE SFP and 2×100 Mbps/1 GbE copper uplinks, fanless, L3 static, PoE-powered
ICX6450-24	24-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-24-A	24-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
ICX6450-24P	24-port 1 GbE switch PoE+ 390 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-24P-A	24-port 1 GbE switch PoE+ 390 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
ICX6450-48	48-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-48-A	48-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
ICX6450-48P	48-port 1 GbE switch PoE+ 780 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-48P-A	48-port 1 GbE switch PoE+ 780 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
Accessories and Options	
ICX6450-PREM-LIC	Brocade ICX 6450/6450-C premium license (Layer 3 features)
ICX6450-2X10G-LIC-POD	Brocade ICX 6450 2×10 GbE capacity-based license; upgrade 1 GbE uplink/stacking ports to 1GbE/10 GbE
ICX6400-EPS1500	Brocade ICX 6430/6450 1500 W external power supply for RPS/EPS (connect up to three switches)
ICX6400-RMK	Brocade ICX 6400 two-post rack mount kit, spare
ICX6400-C12-RMK	Brocade ICX 6400-C compact switch 2-post rack mount kit
ICX6400-C12-MGNT	Brocade ICX 6400-C compact switch magnet mount kit
10G-SFPP-TWX-0101	Direct-attached SFP+ copper cable, 1 m, one-pack, stacking cable
10G-SFPP-TWX-0301	Direct-attached SFP+ copper cable, 3 m, one-pack, stacking cable
10G-SFPP-TWX-0501	Direct-attached SFP+ copper cable, 5 m, one-pack, stacking cable
1G-SFP-TWX-0101	Direct-attached 1 Gbps SFP copper cable, 1 m, stacking cable
1G-SFP-TWX-0501	Direct-attached 1 Gbps SFP copper cable, 5 m, stacking cable
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, one-pack
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), target range 300 m over MMF
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF
10G-SFPP-ER	10GBASE-ER SFP+ optic (LC), for up to 40 km over SMF
10G-SFPP-LRM	10GBASE-LRM, 1310 nm SFP+ optic (LC), TAR
E1MG-TX	1000BASE-TX SFP copper, RJ-45 connector
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring-capable
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring-capable
E1MG-LHA-OM	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring-capable; 80 km
E1MG-LHB	1000BASE-LHB SFP optic, SMF, LC connector, 150 km maximum reach
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring-capable (Brocade ICX 6400-C only)

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BROCADE ESSENTIAL SUPPORT

DIRECT SUPPORT

Enabling Non-Stop Networking with Flexible Support Options

HIGHLIGHTS

- Provides 24×7 access to Brocade Technical Support expertise, reducing time to resolution
- Provides unmatched expertise in data center networking to optimize network performance
- Offers a variety of Service Level Agreements (SLAs) tailored to meet organizations' unique support needs
- Simplifies network management through online technical support tools

Brocade understands that every network is unique and requires a different level of technical support to meet the customer's business requirements. Brocade Direct Support provides a single support contact for SAN and IP networking products purchased through Brocade, Brocade OEM Partners, or Brocade Solution Providers. Organizations facing the challenges of maintaining large or complex networking environments gain immediate access to Brocade expertise and resources to accelerate problem resolution, increase uptime, and improve overall efficiency

BROCADE ESSENTIAL SUPPORT SERVICE-LEVEL OPTIONS

Brocade® Essential Support provides software and hardware support to customers with Brocade equipment. Essential Support includes 24×7 access to the Technical Assistance Center (TAC) (available through phone, e-mail, and Web), software updates, online self-service tools, and offers several hardware replacement options.

SERVICE-LEVELS DEFINED

To help customers meet critical business objectives, Essential Support offers several SLA options, providing increased flexibility and choice:

- **4-hour Onsite (4OS):** Provides 4-hour response for onsite parts and labor from the time Brocade has determined a replacement is required and confirmed dispatch with the customer. 4OS is available in most major metropolitan areas worldwide and is available 24×7, including holidays. Offer also includes 24×7 access to the TAC, software updates, and online self-service tools.
- **4-hour Parts (4P):** Provide 4-hour response for parts replacement from the time Brocade has determined a replacement is required and confirmed dispatch with the customer. Physical installation of the replacement part and defective product return are to be performed by the customer. 4P is available in most major metropolitan areas worldwide and is available 24×7, including holidays. Offer also includes 24×7 access to the TAC, software updates, and online self-service tools.

- **Next-business-Day Onsite (NDO):** Provides next-business-day response for onsite parts and labor from the time Brocade has determined a replacement is required and confirmed dispatch with the customer. NDO is available in most major metropolitan areas worldwide and is available on business days 9×5 local time to customer site. Offer also includes 24×7 access to the TAC, software updates, and online self-service tools.
- **Next-business-Day Parts (NDP):** Provide next-business-day response for parts replacement from the time Brocade has determined a replacement is required and confirmed dispatch with the customer. Physical installation of the replacement part and defective product return are to be performed by the customer. NDP is available in most major metropolitan areas worldwide and is available on business days 9×5 local time to customer site. Offer also includes 24×7 access to the TAC, software updates, and online self-service tools.
- **Return to Factory (RTF):** Provides a five-business-day reshipment for parts replacement from the time Brocade has physically received the defective material and confirmed dispatch with customer. Customer is responsible for return shipping costs as well as items lost or damaged in transit. Delivery times may vary due to customs and regulations that are outside of Brocade control. RTF is available worldwide and includes 24×7 access to the TAC, software updates, and online self-service tools.
- **Remote Support (RMT):** Provides 24×7 access to the TAC, software updates, and online self-service tools. RMT is available worldwide and 24×7, including holidays. RMT is only available on selected products. Any required hardware repairs would be performed under warranty or on a time and material basis.
- **Software Technical Support (SW):** Provides 24×7 access to the TAC, software updates, and online self-service tools. SW is available worldwide and 24×7, including holidays. SW is only available for software applications.

ONLINE TECHNICAL SUPPORT TOOLS

Customers with a valid Brocade Technical Support contract have 24×7 access to several online tools through MyBrocade®:

- **My Cases:** Provides access to a case management tool, allowing customers to open, update, and track cases in real time.
- **Downloads:** Allows customers to obtain OS firmware and code updates as well as drivers, MIBs, utilities, and documentation.
- **Knowledge base:** Enables customers to research and solve technical questions through a robust database of articles.

WORLD-CLASS SUPPORT INFRASTRUCTURE

Brocade Technical Support is designed to provide optimal support for Essential Support customers. They can leverage the Brocade worldwide support infrastructure, expertise, best-practice guidance, and commitment to quality to maximize their network uptime.

Table 1. Summary of Brocade Essential Support service-level options.

Support Level Agreements (SLAs)*	Technical Assistance Center	MyBrocade: Online Self Services, KB, and Case Management	Software Updates and Downloads
• 4-hour[1,3] Onsite (4OS) • 4-hour[1,3] Parts (4P) • Next-business-Day[2] Onsite (NDO) • Next-business-Day[2] Parts (NDP) • Return to Factory (RTF) • Remote Support[4] (RMT) • Software Support (SW)	24×7 access	Unlimited	Unlimited

* 2-hour response times are available in limited locations throughout the United States upon request.

[1] To determine if your specific location is within the required distance for a 4-hour response, please visit: www.brocade.com/support-availability.

[2] Next-business-day delivery is available when Brocade receives a case by 2:00 p.m. local time and customer distance from the nearest parts depot is within commercial carrier's standard next-business-day delivery area (some restrictions may apply). If customer location is outside the commercial carrier's next-business-day delivery area parts will ship same or next day (2:00 p.m. local time cutoff for same day shipping, some restrictions may apply). Delivery times may vary due to customs and local regulations which are outside of the Brocade control. Customers may be responsible for importation costs, brokerage fees, import duties, and taxes. Next-business-day is not available on selected holidays. To determine if your specific location is within the required distance for next-business-day delivery please visit: www.brocade.com/support-availability.

[3] Subject to customer providing Brocade with a description of the repair problem, part number, serial number, and return address.

[4] Only available on select products.

Table 2. Severity levels and Brocade Technical Support response and escalation times.[5]

Case Severity	Technical Engagement Time	Communication Frequency	Management Escalation
Severity 1 Critical	Within 1 hour	Updates every 6 hours	8 business hours
Severity 2 High	Within 1 hour	Updates every 2 days	2 business days
Severity 3 Medium	Within 8 hours	Updates every 4 days	7 business days
Severity 4 Low	Within 8 hours	Updates every 14 days	Not applicable

[5] The times listed are targets only and not a guarantee that Brocade will respond or escalate within the target time. See www.brocade.com for Case Severity definitions.

Worldwide Coverage

With multiple TACs located around the world and more than 170 parts depots in over 40 countries, Brocade is capable of delivering effective support. Through this worldwide support infrastructure, Essential Support customers have access to a strong partner ecosystem capable of performing onsite repair and/or replacement. In addition, toll-free numbers and local language support enable easy communication with Brocade Technical Support.

Brocade Expertise

Brocade Technical Support engineers have deep networking expertise and are trained to resolve network problems as quickly as possible to minimize downtime. Furthermore, Brocade Technical Support engineers receive ongoing training and certification to provide customers with the most skilled team to address their issues.

Commitment to Quality

Leveraging best practices and fostering a culture of continuous improvement, Brocade offers high-quality technical support for its networking solutions by investing in its processes, people, and partnerships. Brocade gathers customer feedback on service delivery, procedures, systems, products, and offerings, and makes necessary adjustments to optimize its processes. In addition, Brocade invests in its people through continuous education, providing customers a professional team with the networking expertise to quickly resolve issues. Brocade also invests in its partnerships, performing quarterly business reviews with partners to identify areas for improvement.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

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BROCADE

BROCADE

BROCADE CAMPUS LAN SWITCHING PRODUCT WARRANTY AND SUPPORT OVERVIEW

	Brocade ICX 6610 ICX 6650 FCX FSX 800 FSX 1600	Brocade ICX 6430-C12 ICX 6430 ICX 6450	Brocade FWS	Brocade FGS FLS FES FESX Super X	Optics with Brocade ICX 6610 FCX FSX 800 FSX 1600	Optics with Brocade ICX 6430 ICX 6450	External Power Supply ICX 6400-ESP 1500
WARRANTY							
Brocade Assurance Limited Lifetime Warranty*	✓	✓	✓				
Limited Lifetime Warranty*				✓			
Standard Limited Warranty* (13 months from ship)					✓	✓	✓
HARDWARE DEFECT REPLACEMENT DURING WARRANTY							
Advanced Replacement Next Business Day*	✓	✓	✓				
Repair or Replace 30-days				✓	✓	✓	✓
ACCESS TO SOFTWARE DEFECT DOWNLOADS DURING WARRANTY							
Included through the product end of support date*	✓	✓					
Included for the firmware release current at time of purchase or any previous release. Brocade's Knowledge Portal.			✓				
Accessible for 90-days from ship				✓			
ACCESS TO SOFTWARE MAINTENANCE UPDATES DURING WARRANTY							
Included through the product end of support date*	✓	✓					
Optional Essential Support contracts required			✓	✓			
ACCESS TO SOFTWARE UPGRADES							
Optional L3 license upgrades are available for purchase	✓	✓	✓	✓			
ACCESS TO NEW SOFTWARE FEATURES							
Optional Essential Support contracts are required	✓	✓	✓	✓			
ACCESS TO TECHNICAL SUPPORT							
Included for 90-days 8x5	✓				✓		
Included for 3-years 8x5		✓				✓	✓
Optional Essential Support contracts are required			✓	✓			

*See detailed information at www.brocade.com/warranty.

GENERAL QUESTIONS AND ANSWERS

Q Is an Essential Support contract required to download software updates?

A For the Brocade® FastIron® and ICX® switches, an Essential Support contract is not required to download software defect repairs and software maintenance updates posted on Brocade.com. However, it should be noted that a support contract is required to download software maintenance updates for licensed Advanced routing images (Brocade ICX 6610, Brocade FCX®).

Q Do the enterprise campus switches include downloading of minor and major software releases or revisions?

A The Brocade FastIron and ICX switches include downloading of software defect repairs and software maintenance updates that are incorporated in minor software releases and new software releases.

Q What is a software maintenance update or release?

A End users with Brocade FCX, Brocade FastIron SX 800/1600, and Brocade ICX 6610, ICX 6450, and ICX 6430 products will be provided access to software maintenance updates and software defect repairs to maintain the compliance of the software with published specifications, release notes, and industry-standards compliance. A software maintenance update or release may include defect repairs and limited platform-specific improvements to ensure that the product features available to the device on the original purchase date continue to function in the customer network.

Q Are software upgrades included with the Brocade FastIron and ICX campus products?

A For the Brocade FastIron and ICX switches, "software upgrades" mean moving from the FastIron Base features image to a Premium or Advanced routing image, or moving from a Premium to an Advanced routing image. These forms of software upgrades require the purchase of an upgrade license and are not included with the products. Optional software upgrades are available for purchase.

Q Are new features and functionality included with the software downloads?

A Brocade does not guarantee that any new features or functionality will be developed and made available to the end user in future software revisions or releases. A current Essential Support contract inclusive of software downloads is required to gain access to new features and functionality for the software license level that is purchased for and installed on the device.

Q Are power supplies and fans covered under the warranty?

A Internal and hot-swappable power supplies and fans purchased with the Brocade FastIron and ICX switches are covered under the product warranty.

Pleasanton Unified School District

Amador Valley High School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
B building	Left of B-3	8							8			1			2			
C building	Left of C-3	6							6			1			2			
D building	Double doors to the left of D-5 outside door	9							9			1			2			
E building	double doors left of E-3	5							5			1			2			
F building	Back of building							2	2	1					2			
G building	Back of building behind double doors	5							5			1			2			
H building	South side	12							12			1			2			
I building	South side	10							10			1			2			
L building	North side	6							6			1			2			
M building	M-5 door, south side	9							9			1			2			
Q building	West side center, 1st floor	12							12			1			2			
Q building	2nd floor, closet inside Girl's bathroom	12							12			1			2			
Boy's Gym	Outside boy's locker room						6		6		1	1			2			
Music Building	West side	1							1	1					2			
Portables	P-4	5							5			1			2			
Portables	P-6	3							3	1					2			
Girl's Gym	Outside girl's locker room						6		6	1	3				2			
Front Office	Room behind principal's secretary desk		4	2					6			1			2			
Library	Back Room / MDF	8				2			10			1		1	2			
	None allocated	3														38	38	38
	Total	**114**	**4**	**2**	**0**	**2**	**12**	**2**	**133**	**4**	**4**	**15**	**0**	**1**	**38**	**38**	**38**	**38**

Ruckus R600 — Total 3X3:3 Access Points: 120
$ 262.65 — Cost for 2X2 AP: **$ 31,518.00**
0

Ruckus R700 — Total 3X3 Access Points: 16
$ 360.50 — Cost for 3X3 AP: **$ 5,768.00**

Brocade 6430 C12 — Total C12 IDF Switch: 4
$ 296.41 — Cost for Small PoE Switch: **$ 1,185.65**

Brocade ICX 6430 24 PoE — Total 24 Ports Switch: 15
$ 548.15 — Cost for 24 PoE Switch: **$ 8,222.18**

Brocade ICX 6430 48 PoE — Total 48 Ports Switch: 0
$ 1,287.50 — Cost for 48 PoE Switch: **$ -**

ICX 7750 -48F — Total Core Switch count: 1
$ 5,738.21 — Cost for Core Switch: **$ 5,738.21**
Brocade Core Switch ICX 7750-48F, RPS16E, ICX-FAN10-E

Brocade 1G SFP (original) — Total SFP count: 38
$ 58.49 — Cost for Fiber SFP: **$ 2,222.76**

Cabling Material — Total Material: 38
$ 396.55 — Cost for Cabling Material: **$ 15,068.90**

Local Tax — Total Taxable Items: $ 75,440.77
9% — Total Tax: **$ 6,789.67**

Total Engineering Service: 38
$ 128.75 — Cost Engr Svr: **$ 4,892.50**

Total Cabling Service: 38
$ 916.70 — Cost Cabling Svr: **$ 34,834.60**

Total Labor / Pro Services	$ 39,727.10
Total Products & Material	$ 75,440.77
Total Tax	$ 6,789.67
WLAN Controller W Lic. cost allocated for this site	$ 8,393.95
Site Grand Total	**$ 130,351.49**

Brocade 6450 C12 PD — Total C12 Gym Switches: 4
$ 431.77 — Cost for C12 Switch: **$ 1,727.06**

Installation Misc. Material — Fiber, Cat 6 Patch cables , AP Cages and misc.: 133
$ 30.00 — Cost for Installation Material: **$ 3,990.00**

Pleasanton Unified School District

Foothill High School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
A building	Main Office - Fire Panel Box door	9	4	2					15			1			2			
B building	closet off hallway by west door	34							34				1		2			
C building - Library	Wall / MDF	2				3			5			1		1	2			
D building	Electrical Room - hallway between buildings	13							13			1			2			
D building	Custodian Room - First Floor - opposite D-3	18							18	1		1			4			
F building	double door - west side	5					6		11	1	3	1			2			
H building	double door - southeast side	4						3	7			1			2			
I building	double door - north side	8							8			1			2			
J building	inside between J11 & J12	2							2	1					2			
J building	closet in middle of J building	10							10			1			2			
Portables	P-3	6							6	1					2			
	None allocated	2														24	24	24
	Total	**113**	**4**	**2**	**0**	**3**	**6**	**3**	**129**	**4**	**3**	**8**	**1**	**1**	**24**	**24**	**24**	**24**

Ruckus R600
$ 262.65 Cost for 2X2 AP
0

Total 3X3:3 Access Points 119
$ 31,255.35

Ruckus R700
$ 360.50 Cost for 3X3 AP

Total 3X3 Access Points 12
$ 4,326.00

Brocade 6430 C12
$ 296.41 Cost for Small PoE Switch

Total C12 IDF Switch 4
$ 1,185.65

Brocade ICX 6430 24 PoE
$ 548.15 Cost for 24 PoE Switch

Total 24 Ports Switch 8
$ 4,385.16

Brocade ICX 6430 48 PoE
$ 1,287.50 Cost for 48 PoE Switch

Total 48 Ports Switch 1
$ 1,287.50

ICX 7750 -48F
$ 5,738.21 Cost for Core Switch
Brocade Core Switch ICX 7750-48F, RPS16E, ICX-FAN10-E

Total Core Switch count 1
$ 5,738.21

Brocade 1G SFP (original)
$ 58.49 Cost for Fiber SFP

Total SFP count 24
$ 1,403.85

Cabling Material
$ 396.55 Cost for Cabling Material

Total Material 24
$ 9,517.20

Local Tax
9% Total Tax

Total Taxable Items $ 64,264.23
$ 5,783.78

Total Engineering Service 24
$ 128.75 Cost Engr Svr
$ 3,090.00

Total Cabling Service 24
$ 916.70 Cost Cabling Svr
$ 22,000.80

Total Labor / Pro Services	$ 25,090.80
Total Products & Material	$ 64,264.23
Total Tax	$ 5,783.78
WLAN Controller W Lic. cost allocated for this site	$ 8,141.50
Site Grand Total	**$ 103,280.30**

Brocade 6450 C12 PD
$ 431.77 Cost for C12 Switch

Total C12 Gym Switches 3
$ 1,295.30

Installation Misc. Material
$ 30.00 Cost for Installation Material

Fiber, Cat 6 Patch cables , AP Cages and misc. 129
$ 3,870.00

Pleasanton Unified School District

Pleasanton Middle School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Administration	closet in back of office / MDF		3	1					4			1		1	2			
Library	closet behind counter	2				3			5			1			2			
building 200	room 211 bathroom	4							4			1			2			
building 200	custodian room next to room 207	6							6			1			2			
building 300	room 311 bathroom	6							6			1			2			
building 300	custodian room next to room 307	4							4			1			2			
building 400	custodian closet behind room 408	8							8			1			2			
building 400	workroom between rooms 419A & 419B	2							2	1					2			
building 600	room 611 bathroom	4							4			1			2			
building 600	custodian closet next to room 607	6							6			1			2			
building 700	room 711 bathroom	4							4			1			2			
building 700	custodian closet near room 707	6							6			1			2			
building 800	room 806	4							4			1			2			
MPR	closet off of Main Custodial Room						3	3	6		2	1			2			
	None allocated															28	28	28
	Total	**56**	**3**	**1**	**0**	**3**	**3**	**3**	**69**	**1**	**2**	**13**	**0**	**1**	**28**	**28**	**28**	**28**

Ruckus R600		Total 3X3:3 Access Points	60							
$	262.65	Cost for 2X2 AP	$	**15,759.00**						
	0									
Ruckus R700		Total 3X3 Access Points	9					Total Engineering Service	28	
$	360.50	Cost for 3X3 AP	$	**3,244.50**		$	128.75	Cost Engr Svr	$	**3,605.00**
Brocade 6430 C12		Total C12 IDF Switch	1					Total Cabling Service	28	
$	296.41	Cost for Small PoE Switch	$	**296.41**		$	916.70	Cost Cabling Svr	$	**25,667.60**
Brocade ICX 6430 24 PoE		Total 24 Ports Switch	13							
$	548.15	Cost for 24 PoE Switch	$	**7,125.89**				**Total Labor / Pro Services**	$	29,272.60
								Total Products & Material	$	47,838.77
Brocade ICX 6430 48 PoE		Total 48 Ports Switch	0					**Total Tax**	$	4,305.49
$	1,287.50	Cost for 48 PoE Switch	$	-				**WLAN Controller W Lic. cost allocated for this site**	$	4,354.75
								Site Grand Total	$	**85,771.61**
ICX 7750 -48F		Total Core Switch count	1			Brocade 6450 C12 PD		Total C12 Gym Switches	2	
$	5,738.21	Cost for Core Switch	$	**5,738.21**		$	431.77	Cost for C12 Switch	$	**863.53**
Brocade Core Switch ICX 7750-48F, RPS16E, ICX-FAN10-E										
Brocade 1G SFP (original)		Total SFP count	28							
$	58.49	Cost for Fiber SFP	$	**1,637.82**						
Cabling Material		Total Material	28			Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.	69	
$	396.55	Cost for Cabling Material	$	**11,103.40**		$	30.00	Cost for Installation Material	$	**2,070.00**
Local Tax		Total Taxable Items	$	47,838.77						
	9%	Total Tax	$	**4,305.49**						

Pleasanton Unified School District

Harvest Park Middle School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GWM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Library	Server Room / MDF					3			3					1				
Office	Copy Room	3	3	1					7			1			2			
E39	back of room	5							5			1			2			
Boy's Gym	store room						3		3		2	1			2			
D building	room D27 store room	11							11			1			2			
C building/MPR	room C25 - on top of shelf	2						3	5			1			2			
B building	B21 store room	12							12			1			2			
A building	custodian's room - left of A10	11							11			1			2			
Pre-School	room 3 - cabinet in back of room	3							3	1					2			

None allocated 16 16 16

Total **47** **3** **1** **0** **3** **3** **3** **60** **1** **2** **7** **0** **1** **16** **16** **16** **16**

Ruckus R600 — Total 3X3:3 Access Points: 51
$ 262.65 — Cost for 2X2 AP — **$ 13,395.15**
0

Ruckus R700 — Total 3X3 Access Points: 9
$ 360.50 — Cost for 3X3 AP — **$ 3,244.50**

Brocade 6430 C12 — Total C12 IDF Switch: 1
$ 296.41 — Cost for Small PoE Switch — **$ 296.41**

Brocade ICX 6430 24 PoE — Total 24 Ports Switch: 7
$ 548.15 — Cost for 24 PoE Switch — **$ 3,837.02**

Brocade ICX 6430 48 PoE — Total 48 Ports Switch: 0
$ 1,287.50 — Cost for 48 PoE Switch — **$ -**

ICX 7750 -48F — Total Core Switch count: 1
$ 5,738.21 — Cost for Core Switch — **$ 5,738.21**
0

Brocade 1G SFP (original) — Total SFP count: 16
$ 58.49 — Cost for Fiber SFP — **$ 935.90**

Cabling Material — Total Material: 16
$ 396.55 — Cost for Cabling Material — **$ 6,344.80**

Local Tax — Total Taxable Items: $ 36,455.52
9% Total Tax — **$ 3,281.00**

Total Engineering Service: 16
$ 128.75 — Cost Engr Svr — **$ 2,060.00**

Total Cabling Service: 16
$ 916.70 — Cost Cabling Svr — **$ 14,667.20**

Total Labor / Pro Services	$ 16,727.20
Total Products & Material	$ 36,455.52
Total Tax	$ 3,281.00
WLAN Controller W Lic. cost allocated for this site	$ 3,786.74
Site Grand Total	**$ 60,250.46**

Brocade 6450 C12 PD — Total C12 Gym Switches: 2
$ 431.77 — Cost for C12 Switch — **$ 863.53**

Installation Misc. Material — Fiber, Cat 6 Patch cables , AP Cages and misc.: 60
$ 30.00 — Cost for Installation Material — **$ 1,800.00**

Pleasanton Unified School District

Walnut Grove Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
building 100	room 111 (electrical room)	9							9			1			2			
building 200	room 215 (electrical room)	12							12			1			2			
building 300	room 318 - Data Room / MDF	1	2	1	2				6					1				
building 400	room 414 (electrical room)	11							11			1			2			
building 500	room 514 (electrical room)	3							3	1					2			
MPR	electrical room off Mr. Mike's office							3	3	1					2			
	None allocated	1														10	10	10
	Total	**37**	**2**	**1**	**2**	**0**	**0**	**3**	**44**	**2**	**0**	**3**	**0**	**1**	**10**	**10**	**10**	**10**

Ruckus R600		Total 3X3:3 Access Points		42
$	262.65	Cost for 2X2 AP	$	**11,031.30**
	0			
Ruckus R700		Total 3X3 Access Points		3
$	360.50	Cost for 3X3 AP	$	**1,081.50**
Brocade 6430 C12		Total C12 IDF Switch		2
$	296.41	Cost for Small PoE Switch	$	**592.83**
Brocade ICX 6430 24 PoE		Total 24 Ports Switch		3
$	548.15	Cost for 24 PoE Switch	$	**1,644.44**
Brocade ICX 6430 48 PoE		Total 48 Ports Switch		0
$	1,287.50	Cost for 48 PoE Switch	$	-
ICX 7450 -24 PoE W 8X1GF		Total Core Switch count		1
$	1,399.40	Cost for Core Switch	$	**1,399.40**
Brocade Core Switch ICX7450-24P, RPS16E, ICX-FAN10-E, & (2) ICX7400-4X1GF				
Brocade 1G SFP (original)		Total SFP count		10
$	58.49	Cost for Fiber SFP	$	**584.94**
Cabling Material		Total Material		10
$	396.55	Cost for Cabling Material	$	**3,965.50**
Local Tax		Total Taxable Items	$	21,619.90
	9%	Total Tax	$	**1,945.79**

		Total Engineering Service		10
$	128.75	Cost Engr Svr	$	**1,287.50**
		Total Cabling Service		10
$	916.70	Cost Cabling Svr	$	**9,167.00**

Total Labor / Pro Services	$	10,454.50
Total Products & Material	$	21,619.90
Total Tax	$	1,945.79
WLAN Controller W Lic. cost allocated for this site	$	2,776.94
Site Grand Total	**$**	**36,797.14**

Brocade 6450 C12 PD		Total C12 Gym Switches		0
$	431.77	Cost for C12 Switch	$	-
Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.		44
$	30.00	Cost for Installation Material	$	**1,320.00**

Pleasanton Unified School District

Donlon Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
A Pod	Staff Room & Lounge - electrical room / MDF								0					1				
B Pod	closet off bathroom in B-11	16							16			1			2			
C Pod	closet off bathroom in C-16	12	2	1	2				17			1			2			
D Pod	above whiteboard in D-28	3							3	1					2			
D Pod	above whiteboard in D-27	4							4			1			2			
MPR	closet in custodian's office							3	3			1			2			
Kid's Club		2							2	1					2			
	None allocated															12	12	12
	Total	**37**	**2**	**1**	**2**	**0**	**0**	**3**	**45**	**2**	**0**	**4**	**0**	**1**	**12**	**12**	**12**	**12**

Ruckus R600		Total 3X3:3 Access Points	42						
$	262.65	Cost for 2X2 AP	**$**	**11,031.30**					
	0								
Ruckus R700		Total 3X3 Access Points	3				Total Engineering Service		12
$	360.50	Cost for 3X3 AP	**$**	**1,081.50**	$	128.75	Cost Engr Svr	**$**	**1,545.00**
Brocade 6430 C12		Total C12 IDF Switch	2				Total Cabling Service		12
$	296.41	Cost for Small PoE Switch	**$**	**592.83**	$	916.70	Cost Cabling Svr	**$**	**11,000.40**
Brocade ICX 6430 24 PoE		Total 24 Ports Switch	4						
$	548.15	Cost for 24 PoE Switch	**$**	**2,192.58**			**Total Labor / Pro Services**	$	12,545.40
							Total Products & Material	$	27,446.95
							Total Tax	$	2,470.23
Brocade ICX 6430 48 PoE		Total 48 Ports Switch	0				**WLAN Controller W Lic. cost allocated for this site**	$	2,840.06
$	1,287.50	Cost for 48 PoE Switch	**$**	-			**Site Grand Total**	**$**	**45,302.63**
ICX 7750 -48F		Total Core Switch count	1		Brocade 6450 C12 PD		Total C12 Gym Switches		0
$	5,738.21	Cost for Core Switch	**$**	**5,738.21**	$	431.77	Cost for C12 Switch	**$**	-
Brocade Core Switch ICX 7750-48F, RPS16E, ICX-FAN10-E									
Brocade 1G SFP (original)		Total SFP count	12						
$	58.49	Cost for Fiber SFP	**$**	**701.92**					
Cabling Material		Total Material	12		Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.		45
$	396.55	Cost for Cabling Material	**$**	**4,758.60**	$	30.00	Cost for Installation Material	**$**	**1,350.00**
Local Tax		Total Taxable Items	$	27,446.95					
	9%	Total Tax	**$**	**2,470.23**					

Pleasanton Unified School District

Vintage Hill Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GWM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Library	Back Room / MDF	4	2	1	2				9					1				
Custodian Office	behind resource room	10							10			1			2			
4th/5th Grade Hallway	mounted on wall	8							8			1			2			
MPR	storage room - left, front							3	3			1			2			
room 27	case in back of room	5							5			1			2			
room 32	case in back of room	5							5			1			2			
	None allocated															10	10	10
	Total	**32**	**2**	**1**	**2**	**0**	**0**	**3**	**40**	**0**	**0**	**5**	**0**	**1**	**10**	**10**	**10**	**10**

Ruckus R600		Total 3X3:3 Access Points	37						
$	262.65	Cost for 2X2 AP	**$**	**9,718.05**					
	0								
Ruckus R700		Total 3X3 Access Points	3				Total Engineering Service	10	
$	360.50	Cost for 3X3 AP	**$**	**1,081.50**	$	128.75	Cost Engr Svr	**$**	**1,287.50**
Brocade 6430 C12		Total C12 IDF Switch	0				Total Cabling Service	10	
$	296.41	Cost for Small PoE Switch	**$**	-	$	916.70	Cost Cabling Svr	**$**	**9,167.00**
Brocade ICX 6430 24 PoE		Total 24 Ports Switch	5						
$	548.15	Cost for 24 PoE Switch	**$**	**2,740.73**			**Total Labor / Pro Services**	$	10,454.50
							Total Products & Material	$	20,690.11
Brocade ICX 6430 48 PoE		Total 48 Ports Switch	0				**Total Tax**	$	1,862.11
$	1,287.50	Cost for 48 PoE Switch	**$**	-			**WLAN Controller W Lic. cost allocated for this site**	$	2,524.50
							Site Grand Total	**$**	**35,531.22**
ICX 7450 -24 PoE W 8X1GF		Total Core Switch count	1		Brocade 6450 C12 PD		Total C12 Gym Switches	0	
$	1,399.40	Cost for Core Switch	**$**	**1,399.40**	$	431.77	Cost for C12 Switch	**$**	-
Brocade Core Switch ICX7450-24P, RPS16E, ICX-FAN10-E, & (2) ICX7400-4X1GF									
Brocade 1G SFP (original)		Total SFP count	10						
$	58.49	Cost for Fiber SFP	**$**	**584.94**					
Cabling Material		Total Material	10		Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.	40	
$	396.55	Cost for Cabling Material	**$**	**3,965.50**	$	30.00	Cost for Installation Material	**$**	**1,200.00**
Local Tax		Total Taxable Items	$	20,690.11					
	9%	Total Tax	**$**	**1,862.11**					

Pleasanton Unified School District

Valley View Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Library	Back Room / MDF		2	1	2				5					1				
MPR	electrical room							3	3	1					2			
room 25	cabinet back right	7							7			1			2			
room 19	storage room near room 19	4							4			1			2			
room 16	electrical room near room 16	6							6			1			2			
A building	electrical room near A-3	10							10			1			2			
Kindergarten	cabinet outside room	5							5			1			2			
	None allocated															12	12	12
	Total	**32**	**2**	**1**	**2**	**0**	**0**	**3**	**40**	**1**	**0**	**5**	**0**	**1**	**12**	**12**	**12**	**12**

Ruckus R600		Total 3X3:3 Access Points		37					
$	262.65	Cost for 2X2 AP	$	9,718.05					
	0								
Ruckus R700		Total 3X3 Access Points		3			Total Engineering Service		12
$	360.50	Cost for 3X3 AP	$	1,081.50		$	128.75	Cost Engr Svr	$ 1,545.00
Brocade 6430 C12		Total C12 IDF Switch		1			Total Cabling Service		12
$	296.41	Cost for Small PoE Switch	$	296.41		$	916.70	Cost Cabling Svr	$ 11,000.40
Brocade ICX 6430 24 PoE		Total 24 Ports Switch		5					
$	548.15	Cost for 24 PoE Switch	$	2,740.73				**Total Labor / Pro Services**	$ 12,545.40
								Total Products & Material	$ 21,896.61
								Total Tax	$ 1,970.70
Brocade ICX 6430 48 PoE		Total 48 Ports Switch		0				**WLAN Controller W Lic. cost allocated for this site**	$ 2,524.50
$	1,287.50	Cost for 48 PoE Switch	$	-				**Site Grand Total**	$ **38,937.20**
ICX 7450 -24 PoE W 8X1GF		Total Core Switch count		1		Brocade 6450 C12 PD		Total C12 Gym Switches	0
$	1,399.40	Cost for Core Switch	$	1,399.40		$	431.77	Cost for C12 Switch	$ -
Brocade Core Switch ICX7450-24P, RPS16E, ICX-FAN10-E, & (2) ICX7400-4X1GF									
Brocade 1G SFP (original)		Total SFP count		12					
$	58.49	Cost for Fiber SFP	$	701.92					
Cabling Material		Total Material		12		Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.	40
$	396.55	Cost for Cabling Material	$	4,758.60		$	30.00	Cost for Installation Material	$ 1,200.00
Local Tax		Total Taxable Items	$	21,896.61					
	9%	Total Tax	$	1,970.70					

Pleasanton Unified School District

Lydiksen Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
A building	electrical room	6							6			1						
B building	electrical room	6							6			1			2			
C building	electrical room	6							6			1			2			
D building	electrical room	2							2	1					2			
E building	workroom between E9 and E11	16							16			1			2			
Library	Back Room / MDF		2	1	2				5					1	2			
MPR	custodian's office							3	3	1					2			
	None allocated															12	12	12
	Total	**36**	**2**	**1**	**2**	**0**	**0**	**3**	**44**	**2**	**0**	**4**	**0**	**1**	**12**	**12**	**12**	**12**

Ruckus R600		Total 3X3:3 Access Points	41						
$ 262.65	Cost for 2X2 AP		**$ 10,768.65**						
0									
Ruckus R700		Total 3X3 Access Points	3					Total Engineering Service	12
$ 360.50	Cost for 3X3 AP		**$ 1,081.50**			$ 128.75	Cost Engr Svr		**$ 1,545.00**
Brocade 6430 C12		Total C12 IDF Switch	2					Total Cabling Service	12
$ 296.41	Cost for Small PoE Switch		**$ 592.83**			$ 916.70	Cost Cabling Svr		**$ 11,000.40**
Brocade ICX 6430 24 PoE		Total 24 Ports Switch	4						
$ 548.15	Cost for 24 PoE Switch		**$ 2,192.58**						
Brocade ICX 6430 48 PoE		Total 48 Ports Switch	0						
$ 1,287.50	Cost for 48 PoE Switch		**$ -**						
ICX 7450 -24 PoE W 8X1GF		Total Core Switch count	1			Brocade 6450 C12 PD		Total C12 Gym Switches	0
$ 1,399.40	Cost for Core Switch		**$ 1,399.40**			$ 431.77	Cost for C12 Switch		**$ -**
Brocade Core Switch ICX7450-24P, RPS16E, ICX-FAN10-E, & (2) ICX7400-4X1GF									
Brocade 1G SFP (original)		Total SFP count	12						
$ 58.49	Cost for Fiber SFP		**$ 701.92**						
Cabling Material		Total Material	12			Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.	44
$ 396.55	Cost for Cabling Material		**$ 4,758.60**			$ 30.00	Cost for Installation Material		**$ 1,320.00**
Local Tax		Total Taxable Items	$ 22,815.48						
9%	Total Tax		**$ 2,053.39**						

Total Labor / Pro Services	$	12,545.40
Total Products & Material	$	22,815.48
Total Tax	$	2,053.39
WLAN Controller W Lic. cost allocated for this site	$	2,776.94
Site Grand Total	**$**	**40,191.22**

Pleasanton Unified School District

Alisal Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Office	electrical room on the outside		2	1					3	1								
D building	room 3 - wall case	7							7			1			2			
E building	room 9 - wall case	5							5			1			2			
K building	Room 16 - wall case	4							4			1			2			
K building	Room 22 - wall case	5							5			1			2			
K building	Room 25 - wall case	4							4			1			2			
H building	Room 27 - wall case							3	3	1					2			
G building	Library - Back Room	4			2				6			1			2			
G Building	Electrical Room Next to Custodians / MDF	1							1					1				
Kid's Club		1							1	1					2			

None allocated 16 16 16

	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Total	**31**	**2**	**1**	**2**	**0**	**0**	**3**	**39**	**3**	**0**	**6**	**0**	**1**	**16**	**16**	**16**	**16**

Ruckus R600 — Total 3X3:3 Access Points: 36
$ 262.65 — Cost for 2X2 AP: **$ 9,455.40**
0

Ruckus R700 — Total 3X3 Access Points: 3
$ 360.50 — Cost for 3X3 AP: **$ 1,081.50**

Brocade 6430 C12 — Total C12 IDF Switch: 3
$ 296.41 — Cost for Small PoE Switch: **$ 889.24**

Brocade ICX 6430 24 PoE — Total 24 Ports Switch: 6
$ 548.15 — Cost for 24 PoE Switch: **$ 3,288.87**

Brocade ICX 6430 48 PoE — Total 48 Ports Switch: 0
$ 1,287.50 — Cost for 48 PoE Switch: **$ -**

ICX 7450 -24 PoE W 8X1GF — Total Core Switch count: 1
$ 1,399.40 — Cost for Core Switch: **$ 1,399.40**
Brocade Core Switch ICX7450-24P, RPS16E, ICX-FAN10-E, & (2) ICX7400-4X1GF

Brocade 1G SFP (original) — Total SFP count: 16
$ 58.49 — Cost for Fiber SFP: **$ 935.90**

Cabling Material — Total Material: 16
$ 396.55 — Cost for Cabling Material: **$ 6,344.80**

Local Tax — Total Taxable Items: $ 24,565.11
9% Total Tax: **$ 2,210.86**

Total Engineering Service: 16
$ 128.75 — Cost Engr Svr: **$ 2,060.00**

Total Cabling Service: 16
$ 916.70 — Cost Cabling Svr: **$ 14,667.20**

Total Labor / Pro Services	$ 16,727.20
Total Products & Material	$ 24,565.11
Total Tax	$ 2,210.86
WLAN Controller W Lic. cost allocated for this site	$ 2,461.38
Site Grand Total	**$ 45,964.55**

Brocade 6450 C12 PD — Total C12 Gym Switches: 0
$ 431.77 — Cost for C12 Switch: **$ -**

Installation Misc. Material — Fiber, Cat 6 Patch cables , AP Cages and misc.: 39
$ 30.00 — Cost for Installation Material: **$ 1,170.00**

Pleasanton Unified School District

Fairlands Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Library	back room	10			2				12			1			2			
Office	Closet / MDF	9	2	1					12					1				
room 23	cabinet	12							12			1			2			
MPR	electrical room							3	3	1					2			
	None allocated															6	6	6
	Total	**31**	**2**	**1**	**2**	**0**	**0**	**3**	**39**	**1**	**0**	**2**	**0**	**1**	**6**	**6**	**6**	**6**

Ruckus R600 — Total 3X3:3 Access Points: 36
$ 262.65 — Cost for 2X2 AP — **$ 9,455.40**
0

Ruckus R700 — Total 3X3 Access Points: 3
$ 360.50 — Cost for 3X3 AP — **$ 1,081.50**

Brocade 6430 C12 — Total C12 IDF Switch: 1
$ 296.41 — Cost for Small PoE Switch — **$ 296.41**

Brocade ICX 6430 24 PoE — Total 24 Ports Switch: 2
$ 548.15 — Cost for 24 PoE Switch — **$ 1,096.29**

Brocade ICX 6430 48 PoE — Total 48 Ports Switch: 0
$ 1,287.50 — Cost for 48 PoE Switch — **$ -**

ICX 7450 -24 PoE W 4X1GF — Total Core Switch count: 1
$ 1,312.35 — Cost for Core Switch — **$ 1,312.35**
Brocade Core Switch ICX7450-24P, RPS16E, ICX-FAN10-E, & (1) ICX7400-4X1GF

Brocade 1G SFP (original) — Total SFP count: 6
$ 58.49 — Cost for Fiber SFP — **$ 350.96**

Cabling Material — Total Material: 6
$ 396.55 — Cost for Cabling Material — **$ 2,379.30**

Local Tax — Total Taxable Items: $ 17,142.22
9% — Total Tax — **$ 1,542.80**

$ 128.75 — Cost Engr Svr — Total Engineering Service: 6 — **$ 772.50**

$ 916.70 — Cost Cabling Svr — Total Cabling Service: 6 — **$ 5,500.20**

Total Labor / Pro Services	$ 6,272.70
Total Products & Material	$ 17,142.22
Total Tax	$ 1,542.80
WLAN Controller W Lic. cost allocated for this site	$ 2,461.38
Site Grand Total	**$ 27,419.10**

Brocade 6450 C12 PD — Total C12 Gym Switches: 0
$ 431.77 — Cost for C12 Switch — **$ -**

Installation Misc. Material — Fiber, Cat 6 Patch cables , AP Cages and misc.: 39
$ 30.00 — Cost for Installation Material — **$ 1,170.00**

Pleasanton Unified School District

Mohr Elementary School

Building	Rack Location	Classrooms (2R)	Admin (2R)	Conf. (2R)	Lib. ES (4R)	Lib. MS/HS (6R)	GYM (6R)	MPR (6R)	PoE Ports	C12 W4 PoE IDF	C12 PD W4 PoE GYM	24 PoE Switch	48 PoE Switch	Core Switch	Fiber SFP	Material	Cabling	Engineering
Office	back room, cabinet		2	1					3			1			2			
Library	Back Room / MDF				2				2	1				1	2			
C building	electrical closet	2							2	1					2			
MPR/ Building D	electrical closet (off parking lot)							3	3			1			2			
building 11-12/Two Story	electrical closet	8							8			1			2			
building 10	electrical closet between 10A and 10B	2							2	1					2			
building 8	electrical closet between 8A and 8B	2							2	1					2			
building 9	electrical closet between 9A and 9B	2							2	1					2			
building 6	electrical closet between 6A and 6B	2							2	1					2			
building 7	electrical closet between 7A and 7B	2							2	1					2			
building 5	electrical closet between 5A and 5B	2							2	1					2			
building 4/ E building	electrical closet between 4B and 4C	2							2	1					2			
building 3	electrical closet between 3A and 3B	2							2	1					2			
building 2	electrical closet between 2A and 2B	2							2	1					2			
building 1	electrical closet between 1A and 1B	2							2	1					2			
building K	electrical closet between K1 and K2	2							2	1					2			
	None allocated															32	32	32
	Total	**32**	**2**	**1**	**2**	**0**	**0**	**3**	**40**	**13**	**0**	**3**	**0**	**1**	**32**	**32**	**32**	**32**

Ruckus R600		Total 3X3:3 Access Points		37					
$	262.65	Cost for 2X2 AP		$	9,718.05				
	0								
Ruckus R700		Total 3X3 Access Points		3				Total Engineering Service	32
$	360.50	Cost for 3X3 AP		$	1,081.50	$	128.75	Cost Engr Svr	$ 4,120.00
Brocade 6430 C12		Total C12 IDF Switch		13				Total Cabling Service	32
$	296.41	Cost for Small PoE Switch		$	3,853.37	$	916.70	Cost Cabling Svr	$ 29,334.40
Brocade ICX 6430 24 PoE		Total 24 Ports Switch		3					
$	548.15	Cost for 24 PoE Switch		$	1,644.44			**Total Labor / Pro Services**	$ 33,454.40
								Total Products & Material	$ 37,796.97
								Total Tax	$ 3,401.73
Brocade ICX 6430 48 PoE		Total 48 Ports Switch		0				**WLAN Controller W Lic. cost allocated for this site**	$ 2,524.50
$	1,287.50	Cost for 48 PoE Switch		$	-			**Site Grand Total**	**$ 77,177.59**
ICX 7750 -48F		Total Core Switch count		1		Brocade 6450 C12 PD		Total C12 Gym Switches	0
$	5,738.21	Cost for Core Switch		$	5,738.21	$	431.77	Cost for C12 Switch	$ -
Brocade Core Switch ICX 7750-48F, RPS16E, ICX-FAN10-E									
Brocade 1G SFP (original)		Total SFP count		32					
$	58.49	Cost for Fiber SFP		$	1,871.80				
Cabling Material		Total Material		32		Installation Misc. Material		Fiber, Cat 6 Patch cables , AP Cages and misc.	40
$	396.55	Cost for Cabling Material		$	12,689.60	$	30.00	Cost for Installation Material	$ 1,200.00
Local Tax		Total Taxable Items	$	37,796.97					
	9%	Total Tax		$	3,401.73				