Agreement No. _____

AGREEMENT BETWEEN THE COUNTY OF SAN MATEO AND AVIAT U.S., INC.

This Agreement is entered into this **___ day of September 2022**, by and between the County of San Mateo, a political subdivision of the state of California, hereinafter called "County," and Aviat U.S., Inc. hereinafter called "Contractor."

* * *

Whereas, pursuant to Section 31000 of the California Government Code, County may contract with independent contractors for the furnishing of such services to or for County or any Department thereof; and

Whereas, it is necessary and desirable that Contractor be retained for the purpose of providing professional services required to engineer and implement the Microwave System Upgrade Project.

Now, therefore, it is agreed by the parties to this Agreement as follows:

1. Exhibits and Attachments

The following exhibits and attachments are attached to this Agreement and incorporated into this Agreement by this reference:

Exhibit A—Services
Exhibit B—Payments, Rates, and Invoicing
Exhibit C—Aviat U.S., Inc. Microwave System Summary
Exhibit D—Aviat U.S., Inc. List of Descriptions of Equipment and Services
Exhibit E—Aviat U.S., Inc. List of Training Courses

2. Services to be performed by Contractor

In consideration of the payments set forth in this Agreement and in Exhibit B, Contractor shall perform services for County in accordance with the terms, conditions, and specifications set forth in this Agreement and in Exhibit A.

3. Payments

In consideration of the services provided by Contractor in accordance with all terms, conditions, and specifications set forth in this Agreement and in Exhibit A, County shall make payment to Contractor based on the rates and in the manner specified in Exhibit B. County reserves the right to withhold payment if County determines that the quantity or quality of the work performed is unacceptable and written notification has been communicated to Contractor. In no event shall County's total fiscal obligation under this Agreement exceed **SIX MILLION FOUR HUNDRED FIFTY-ONE THOUSAND FOUR HUNDRED THIRTY-TWO DOLLARS ($6,451,432)**. In the event that the County makes any advance payments, Contractor agrees to refund any amounts in excess of the amount owed by the County at the time of contract termination or expiration. Contractor is not entitled to payment for work not performed as required by this agreement.

4. Term

Subject to compliance with all terms and conditions, the term of this Agreement shall be from **September 13, 2022, through September 12, 2025.**

5. Termination

This Agreement may be terminated by Contractor or by the County's Information Services Department (ISD), Chief Information Officer (CIO) or CIO's designee at any time without a requirement of good cause upon thirty (30) days' advance written notice to the other party. Subject to availability of funding, Contractor shall be entitled to receive payment for work/services provided prior to termination of the Agreement. Such payment shall be that prorated portion of the full payment determined by comparing the work/services actually completed to the work/services required by the Agreement.

County may terminate this Agreement or a portion of the services referenced in the Attachments and Exhibits based upon the unavailability of Federal, State, or County funds by providing written notice to Contractor as soon as is reasonably possible after County learns of said unavailability of outside funding.

County may terminate this Agreement for cause. In order to terminate for cause, County must first give Contractor written notice of the alleged breach. Contractor shall have five business days after receipt of such notice to respond and a total of ten calendar days after receipt of such notice to cure the alleged breach. If Contractor fails to cure the breach within this period, County may immediately terminate this Agreement without further action. The option available in this paragraph is separate from the ability to terminate without cause with appropriate notice described above. In the event that County provides notice of an alleged breach pursuant to this section, County may, in extreme circumstances, immediately suspend performance of services and payment under this Agreement pending the resolution of the process described in this paragraph. County has sole discretion to determine what constitutes an extreme circumstance for purposes of this paragraph, and County shall use reasonable judgment in making that determination.

6. Contract Materials

At the end of this Agreement, or in the event of termination, all finished or unfinished documents, data, studies, maps, photographs, reports, and other written materials (collectively referred to as "contract materials") prepared by Contractor under this Agreement shall become the property of County and shall be promptly delivered to County. Upon termination, Contractor may make and retain a copy of such contract materials if permitted by law.

7. Relationship of Parties

Contractor agrees and understands that the work/services performed under this Agreement are performed as an independent contractor and not as an employee of County and that neither Contractor nor its employees acquire any of the rights, privileges, powers, or advantages of County employees.

8. Hold Harmless

a. General Hold Harmless

Contractor shall indemnify and save harmless County and its officers, agents, employees, and servants from all claims, suits, or actions of every name, kind, and description resulting from this Agreement, the performance of any work or services required of Contractor under this Agreement, or payments made pursuant to this Agreement brought for, or on account of, any of the following:

(A) injuries to or death of any person, including Contractor or its employees/officers/agents;

(B) damage to any property of any kind whatsoever and to whomsoever belonging;

(C) any sanctions, penalties, or claims of damages resulting from Contractor's failure to comply, if applicable, with the requirements set forth in the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and all Federal regulations promulgated thereunder, as amended; or

(D) any other loss or cost, including but not limited to that caused by the concurrent active or passive negligence of County and/or its officers, agents, employees, or servants. However, Contractor's duty to indemnify and save harmless under this Section shall not apply to injuries or damage for which County has been found in a court of competent jurisdiction to be solely liable by reason of its own negligence or willful misconduct.

The duty of Contractor to indemnify and save harmless as set forth by this Section shall include the duty to defend as set forth in Section 2778 of the California Civil Code.

b. Intellectual Property Indemnification

Contractor hereby certifies that it owns, controls, and/or licenses and retains all right, title, and/or interest in and to any intellectual property it uses in relation to this Agreement, including the design, look, feel, features, source code, content, and/or other technology relating to any part of the services it provides under this Agreement and including all related patents, inventions, trademarks, and copyrights, all applications therefor, and all trade names, service marks, know how, and trade secrets (collectively referred to as "IP Rights") except as otherwise noted by this Agreement.

Contractor warrants that the services it provides under this Agreement do not infringe, violate, trespass, or constitute the unauthorized use or misappropriation of any IP Rights of any third party. Contractor shall defend, indemnify, and hold harmless County from and against all liabilities, costs, damages, losses, and expenses (including reasonable attorney fees) arising out of or related to any claim by a third party that the services provided under this Agreement infringe or violate any third-party's IP Rights provided any such right is enforceable in the United States. Contractor's duty to defend, indemnify, and hold harmless under this Section applies only provided that: (a) County notifies Contractor promptly in writing of any notice of any such third-party claim; (b) County cooperates with Contractor, at Contractor's expense, in all reasonable respects in connection with the investigation and defense of any such third-party claim; (c) Contractor retains sole control of the defense of any action on any such claim and all negotiations for its settlement or compromise (provided Contractor shall not have the right to settle any criminal action, suit, or proceeding without County's prior written consent, not to be unreasonably withheld, and provided further that any settlement permitted under this Section shall not impose any financial or other obligation on County, impair any right of County, or contain any stipulation, admission, or acknowledgement of wrongdoing on the part of County without County's prior written consent, not to be unreasonably withheld); and (d) should services under this Agreement become, or in Contractor's opinion be likely to become, the subject of such a claim, or in the event such a third party claim or threatened claim causes County's reasonable use of the services under this Agreement to be seriously endangered or disrupted, Contractor shall, at Contractor's option and expense, either: (i) procure for County the right to continue using the services without infringement or (ii) replace or modify the services so that they become non-infringing but remain functionally equivalent.

Notwithstanding anything in this Section to the contrary, Contractor will have no obligation or liability to County under this Section to the extent any otherwise covered claim is based upon: (a) any aspects of the services under this Agreement which have been modified by or for County (other than modification performed by, or at the direction of, Contractor) in such a way as to cause the alleged infringement at issue; and/or (b) any aspects of the services under this Agreement which have been used by County in a manner prohibited by this Agreement.

The duty of Contractor to indemnify and save harmless as set forth by this Section shall include the duty to defend as set forth in Section 2778 of the California Civil Code.

9. Assignability and Subcontracting

Contractor shall not assign this Agreement or any portion of it to a third party or subcontract with a third party to provide services required by Contractor under this Agreement without the prior written consent of County. Any such assignment or subcontract without County's prior written consent shall give County the right to automatically and immediately terminate this Agreement without penalty or advance notice.

10. Insurance

a. General Requirements

Contractor shall not commence work or be required to commence work under this Agreement unless and until all insurance required under this Section has been obtained and such insurance has been approved by County's Risk Management, and Contractor shall use diligence to obtain such insurance and to obtain such approval. Contractor shall furnish County with certificates of insurance evidencing the required coverage, and there shall be a specific contractual liability endorsement extending Contractor's coverage to include the contractual liability assumed by Contractor pursuant to this Agreement. These certificates shall specify or be endorsed to provide that thirty (30) days' notice must be given, in writing, to County of any pending change in the limits of liability or of any cancellation or modification of the policy.

b. Workers' Compensation and Employer's Liability Insurance

Contractor shall have in effect during the entire term of this Agreement workers' compensation and employer's liability insurance providing full statutory coverage. In signing this Agreement, Contractor certifies, as required by Section 1861 of the California Labor Code, that (a) it is aware of the provisions of Section 3700 of the California Labor Code, which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the Labor Code, and (b) it will comply with such provisions before commencing the performance of work under this Agreement.

c. Liability Insurance

Contractor shall take out and maintain during the term of this Agreement such bodily injury liability and property damage liability insurance as shall protect Contractor and all of its employees/officers/agents while performing work covered by this Agreement from any and all claims for damages for bodily injury, including accidental death, as well as any and all claims for property damage which may arise from Contractor's operations under this Agreement, whether such operations be by Contractor, any subcontractor, anyone directly or indirectly employed by either of them, or an agent of either of them. Such insurance shall be combined single limit bodily injury and property damage for each occurrence and shall not be less than the amounts specified below:

(a) Comprehensive General Liability… $1,000,000

(b) Motor Vehicle Liability Insurance… $1,000,000

(c) Professional Liability……. $1,000,000

County and its officers, agents, employees, and servants shall be named as additional insured on any such policies of insurance, which shall also contain a provision that (a) the insurance afforded thereby to County and its officers, agents, employees, and servants shall be primary insurance to the full limits of liability of the policy and (b) if the County or its officers, agents, employees, and servants have other insurance against the loss covered by such a policy, such other insurance shall be excess insurance only.

In the event of the breach of any provision of this Section, or in the event any notice is received which indicates any required insurance coverage will be diminished or canceled, County, at its option, may, notwithstanding any other provision of this Agreement to the contrary, immediately declare a material breach of this Agreement and suspend all further work and payment pursuant to this Agreement.

11. Compliance With Laws

All services to be performed by Contractor pursuant to this Agreement shall be performed in accordance with all applicable Federal, State, County, and municipal laws, ordinances, and regulations, including but not limited to the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the Federal Regulations promulgated thereunder, as amended (if applicable), the Business Associate requirements set forth in Attachment H (if attached), the Americans with Disabilities Act of 1990, as amended, and Section 504 of the Rehabilitation Act of 1973, which prohibits discrimination on the basis of disability in programs and activities receiving any Federal or County financial assistance. Such services shall also be performed in accordance with all applicable ordinances and regulations, including but not limited to appropriate licensure, certification regulations, provisions pertaining to confidentiality of records, and applicable quality assurance regulations. In the event of a conflict between the terms of this Agreement and any applicable State, Federal, County, or municipal law or regulation, the requirements of the applicable law or regulation will take precedence over the requirements set forth in this Agreement.

Contractor will timely and accurately complete, sign, and submit all necessary documentation of compliance as requested and provided by County.

12. Non-Discrimination and Other Requirements

a. General Non-discrimination

No person shall be denied any services provided pursuant to this Agreement (except as limited by the scope of services) on the grounds of race, color, national origin, ancestry, age, disability (physical or mental), sex, sexual orientation, gender identity, marital or domestic partner status, religion, political beliefs or affiliation, familial or parental status (including pregnancy), medical condition (cancer-related), military service, or genetic information.

b. Equal Employment Opportunity

Contractor shall ensure equal employment opportunity based on objective standards of recruitment, classification, selection, promotion, compensation, performance evaluation, and management relations for all employees under this Agreement. Contractor's equal employment policies shall be made available to County upon request.

c. Section 504 of the Rehabilitation Act of 1973

Contractor shall comply with Section 504 of the Rehabilitation Act of 1973, as amended, which provides that no otherwise qualified individual with a disability shall, solely by reason of a disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination in the performance of any

services this Agreement. This Section applies only to contractors who are providing services to members of the public under this Agreement.

d. Compliance with County's Equal Benefits Ordinance

Contractor shall comply with all laws relating to the provision of benefits to its employees and their spouses or domestic partners, including, but not limited to, such laws prohibiting discrimination in the provision of such benefits on the basis that the spouse or domestic partner of the Contractor's employee is of the same or opposite sex as the employee.

e. Discrimination Against Individuals with Disabilities

The nondiscrimination requirements of 41 C.F.R. 60-741.5(a) are incorporated into this Agreement as if fully set forth here, and Contractor and any subcontractor shall abide by the requirements of 41 C.F.R. 60–741.5(a). This regulation prohibits discrimination against qualified individuals on the basis of disability and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified individuals with disabilities.

f. History of Discrimination

Contractor certifies that no finding of discrimination has been issued in the past 365 days against Contractor by the Equal Employment Opportunity Commission, the California Department of Fair Employment and Housing, or any other investigative entity. If any finding(s) of discrimination have been issued against Contractor within the past 365 days by the Equal Employment Opportunity Commission, the California Department of Fair Employment and Housing, or other investigative entity, Contractor shall provide County with a written explanation of the outcome(s) or remedy for the discrimination prior to execution of this Agreement. Failure to comply with this Section shall constitute a material breach of this Agreement and subjects the Agreement to immediate termination at the sole option of the County.

g. Reporting; Violation of Non-discrimination Provisions

Contractor shall report to the County Manager the filing in any court or with any administrative agency of any complaint or allegation of discrimination on any of the bases prohibited by this Section of the Agreement or the Section titled "Compliance with Laws". Such duty shall include reporting of the filing of any and all charges with the Equal Employment Opportunity Commission, the California Department of Fair Employment and Housing, or any other entity charged with the investigation or adjudication of allegations covered by this subsection within 30 days of such filing, provided that within such 30 days such entity has not notified Contractor that such charges are dismissed or otherwise unfounded. Such notification shall include a general description of the circumstances involved and a general description of the kind of discrimination alleged (for example, gender-, sexual orientation-, religion-, or race-based discrimination).

Violation of the non-discrimination provisions of this Agreement shall be considered a breach of this Agreement and subject the Contractor to penalties, to be determined by the County Manager, including but not limited to the following:

i. termination of this Agreement;
ii. disqualification of the Contractor from being considered for or being awarded a County contract for a period of up to 3 years;
iii. liquidated damages of $2,500 per violation; and/or
iv. imposition of other appropriate contractual and civil remedies and sanctions, as determined by the County Manager.

To effectuate the provisions of this Section, the County Manager shall have the authority to offset all or any portion of the amount described in this Section against amounts due to Contractor under this Agreement or any other agreement between Contractor and County.

h. Compliance with Living Wage Ordinance

As required by Chapter 2.88 of the San Mateo County Ordinance Code, Contractor certifies all contractor(s) and subcontractor(s) obligated under this contract shall fully comply with the provisions of the County of San Mateo Living Wage Ordinance, including, but not limited to, paying all Covered Employees the current Living Wage and providing notice to all Covered Employees and Subcontractors as required under the Ordinance.

i. Compliance with Prevailing Wage Ordinance

Contractor hereby agrees to pay not less than prevailing rates of wages and be responsible for compliance with all the provisions of the California Labor Code, Article 2-Wages, Chapter 1, Part 7, Division 2, Section 1770 et seq. A copy of the prevailing wage scale established by the Department of Industrial Relations is on file in the Information Services Department, and available at www.dir.ca.gov/DLSR or by phone at 415-703-4774. California Labor Code Section 1776(a) requires each contractor and subcontractor keep accurate payroll records of trades workers on all public works projects and to submit copies of certified payroll records upon request.

Additionally,

- No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.
- This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

13. Compliance with County Employee Jury Service Ordinance

Contractor shall comply with Chapter 2.85 of the County's Ordinance Code, which states that Contractor shall have and adhere to a written policy providing that its employees, to the extent they are full-time employees and live in San Mateo County, shall receive from the Contractor, on an annual basis, no fewer than five days of regular pay for jury service in San Mateo County, with jury pay being provided only for each day of actual jury service. The policy may provide that such employees deposit any fees received for such jury service with Contractor or that the Contractor may deduct from an employee's regular pay the fees received for jury service in San Mateo County. By signing this Agreement, Contractor certifies that it has and adheres to a policy consistent with Chapter 2.85. For purposes of this Section, if Contractor has no employees in San Mateo County, it is sufficient for Contractor to provide the following written statement to County: "For purposes of San Mateo County's jury service ordinance, Contractor certifies that it has no full-time employees who live in San Mateo County. To the extent that it hires any such employees during the term of its Agreement with San Mateo County, Contractor shall adopt a policy that complies with Chapter 2.85 of the County's Ordinance Code." The requirements of Chapter 2.85 do not apply if this Agreement's total value listed in the Section titled "Payments", is less than one-hundred thousand dollars ($100,000),

but Contractor acknowledges that Chapter 2.85's requirements will apply if this Agreement is amended such that its total value meets or exceeds that threshold amount.

14. Retention of Records; Right to Monitor and Audit

(a) Contractor shall maintain all required records relating to services provided under this Agreement for three (3) years after County makes final payment and all other pending matters are closed, and Contractor shall be subject to the examination and/or audit by County, a Federal grantor agency, and the State of California.

(b) Contractor shall comply with all program and fiscal reporting requirements set forth by applicable Federal, State, and local agencies and as communicated and required by County.

(c) Contractor agrees upon reasonable notice to provide to County, to any Federal or State department having monitoring or review authority, to County's authorized representative, and/or to any of their respective audit agencies access to and the right to examine all records and documents related to this Agreement necessary to determine compliance with relevant Federal, State, and local statutes, rules, and regulations, to determine compliance with this Agreement, and to evaluate the quality, appropriateness, and timeliness of services performed.

15. Merger Clause; Amendments

This Agreement, including the Exhibits and Attachments attached to this Agreement and incorporated by reference, constitutes the sole Agreement of the parties to this Agreement and correctly states the rights, duties, and obligations of each party as of this document's date. In the event that any term, condition, provision, requirement, or specification set forth in the body of this Agreement conflicts with or is inconsistent with any term, condition, provision, requirement, or specification in any Exhibit and/or Attachment to this Agreement, the provisions of the body of the Agreement shall prevail. Any prior agreement, promises, negotiations, or representations between the parties not expressly stated in this document are not binding. All subsequent modifications or amendments shall be in writing and signed by the parties.

16. Controlling Law; Venue

The validity of this Agreement and of its terms, the rights and duties of the parties under this Agreement, the interpretation of this Agreement, the performance of this Agreement, and any other dispute of any nature arising out of this Agreement shall be governed by the laws of the State of California without regard to its choice of law or conflict of law rules. Any dispute arising out of this Agreement shall be venued either in the San Mateo County Superior Court or in the United States District Court for the Northern District of California.

17. Notices

Any notice, request, demand, or other communication required or permitted under this Agreement shall be deemed to be properly given when both: (1) transmitted via facsimile to the telephone number listed below or transmitted via email to the email address listed below; and (2) sent to the physical address listed below by either being deposited in the United States mail, postage prepaid, or deposited for overnight delivery, charges prepaid, with an established overnight courier that provides a tracking number showing confirmation of receipt.

In the case of County, to:

Name/Title:	**Michael Wentworth, Chief Information Officer, Information Services Department**
Address:	455 County Center, 3rd Floor, Redwood City, CA 94063
Telephone:	650-363-4548
Facsimile:	650-363-7800
Email:	mwentworth@smcgov.org

In the case of Contractor, to:

Name/Title:	**Ali Hirsa, Territory Sales Manager, Aviat U.S., Inc. and Legal Department, Aviat U.S., Inc.**
Address:	200 Parker, Suite C100 A, Austin, TX 78728
Telephone:	650-868-3994
Facsimile:	916-274-3970
Email:	ali.hirsa@aviatnet.com

18. Electronic Signature

Both County and Contractor wish to permit this Agreement and future documents relating to this Agreement to be digitally signed in accordance with California law and County's Electronic Signature Administrative Memo. Any party to this Agreement may revoke such agreement to permit electronic signatures at any time in relation to all future documents by providing notice pursuant to this Agreement.

19. Payment of Permits/Licenses

Contractor bears responsibility to obtain any license, permit, or approval required from any agency for work/services to be performed under this Agreement at Contractor's own expense prior to commencement of said work/services. Failure to do so will result in forfeit of any right to compensation under this Agreement.

* * *

In witness of and in agreement with this Agreement's terms, the parties, by their duly authorized representatives, affix their respective signatures:

FOR CONTRACTOR: AVIAT U.S., INC.

_____	**08/22/2022**	**Keith J. Fanneron**
Contractor Signature	Date	Contractor Name (please print)

COUNTY OF SAN MATEO

By:

President, Board of Supervisors, San Mateo County

Date:

ATTEST:

By:

Clerk of Said Board

Exhibit A

SERVICES

In consideration of the payments set forth in Exhibit B, Contractor shall provide the following services for the County of San Mateo:

Description of Services to be provided by Contractor

1. Engagement Overview

1.1 **Project Purpose**

Contractor shall be retained for the purpose of providing services required to plan, delivery of microwave and associated products from Contractor and its partners, as well as the professional services required to engineer and implement the microwave system design upgrade, replacing the former Harris microwave system.

1.2 **Project Scope**

Contractor shall provide the following services:

- Project Management
- Transmission Engineering
- Configuration Engineering/Drafting
- Factory Integration and Testing
- Radio Installation and Testing
- Radio Decommission
- RAD DACS 4100 Factory Integration, Field Installation, and Testing
- Frequency Assurance Solutions (FAS) Software for 6 gHz Hops for 10 years
- Network Engineering
- Project Engineering
- MPLS Network Services
- Antenna and Line Installation
- Network Integration
- Antenna System Decommission

Project Summary

- Number of Hops: 36 + 2
  Number of Sites: 36 + 2
- Number of Parallel RF Channels: 0
  Number of Sites: 0
- Radio Equipment Family(ies): IRU600v4 & ODU600
  Frequency Band(s): 6.11 & 18gHz
- Link Capacity(ies): QAM to 4096 mb/s
  Projection Type(s): NP Ring and HSD Spurs
- Traffic Type(s): Ethernet and T1
  Projection Locations (States): CA

1.3 **Supporting Documents**

Contractor shall provide the following documents in support of this project for

County's review and acceptance as part of the project completion. Once County has accepted each supporting document, County shall sign and return each document to Contractor prior to final project completion.

	Document	**Master Document**	**Requires County's Acceptance/Sign-off**
Planning	Project Schedule	Project Schedule	Yes
	Statement of Work	This document	Yes
	Statement of Work Sign-off	This document	Yes
Design	DC Power calculations	Design Freeze Package	Yes
	Design Freeze Package	Design Freeze Package	Yes
	Equipment List	Equipment List	No
	Frequency Datasheets	Path Survey Report	No
	Floor Plan	Installation Specifications	Yes
	IP Plan	Design Freeze Package	Yes
	NMS Plan	Design Freeze Package	Yes
	Path Calculations and Path Profiles	Path Survey Report	Yes
	Path Survey Report	Path Survey Report	Yes
	Rack Profiles and Wiring Diagrams	Installation Specifications	No
	Site Survey Report	Site Survey Report	Yes
	Synchronization Plan	Design Freeze Package	Yes
	System Layout	Design Freeze Package	No
	Traffic Plan	Design Freeze Package	Yes
Implementation	Antenna Installation Checklist	Installation Specifications	No
	Antenna Mounting Design	Installation Specifications	Yes
	Antenna System Audit Form	Installation Specifications	No
	As Built Record Sets	As Build Records	Yes
	Change Order Form	This document	Yes
	Equipment Installation Checklist	Installation Specifications	Yes
	Field Acceptance Test Plan	Installation Specifications	Yes

	Installation Specifications	Installation Specifications	No
	Injury and Illness Prevention	Installation Specifications	No
	Project Completion Sign-off	This document	Yes
	Punch List Completion Report	Installation Specifications	Yes
	Site Installation Completion Report	Installation Specifications	Yes
	Traffic Cutover Plan	Installation Specifications	Yes
	RF Cutover Plan	Installation Specifications	Yes

1.4 **System Summary**

Contractor shall provide the following services as indicated in Exhibit C- Aviat U.S., Inc. Microwave System Summary.

- Warranties: Three 3 years of hardware and equipment warranty
- Training: Onsite training for Eclipse Radios, MPLS routers, Management System, and RAD 4 100 DACs.
- Refer to ***Exhibit C-Aviat U.S., Inc. Microwave System Summary*** for further details

1.5 **MPLS Design Scope for Projects with this Feature**

Contractor shall provide a detailed IP/MPLS plan covering the following:

- Layer 1 connectivity: list of ports, types, speed/duplex
- Layer 2 parameters: VLANs, Link aggregation schemes
- Layer 3 parameters: IP addresses, mask, topology, IGP protocol, area design, routing and BFD parameters
- MPLS signaling protocols, parameters and protection schemes
- MPLS services: list of all VPNS and their configuration parameters (VRFs, route targets, PWs, etc.)
- QoS schemes: classification rules, priority mapping, scheduling and shaping schemes
- Security plan: user accounts, authentication and encryption schemes
- Management plan: ports, IP addresses and routing

County shall provide the application level requirements for the IP/MPLS backhaul network including:

- List of applications: public safety, video cameras, VOIP, security, etc.
- Performance targets for each application: throughput, latency, jitter, convergence time, and QoS
- List of County/Customer Edge (CE) routers and devices per site
- Number and type of device connections per site
- Required connectivity schemes between CE routers and devices: VPWS, VPLS, or L3VPN
- Required IP address range

1.6 **Period of Performance**

The project Period of Performance is estimated at twenty (20) months after of issuance of a Purchase Order/Receipt of Order (ARO)

1.7 **Field Crew Mobilization**

Contractor has included six (6) mobilization for Contractor's Network Integrators for the duration of the field implementation phase. For any additional mobilizations shall be billed on a time-and expenses basis which is subject to the written approval by the County.

1.8 **On-site Meetings**

Contractor to provide at least four (4) on-site meetings for the Project Manager (PM) and Project Engineer (PE) for this project. In the event, County requests more on-site meeting both parties will mutually agree on the date and time. All other meetings shall be conducted through conference calls through out the duration of this project.

1.9 **Towers and Antenna Structures**

Contractor assumes all towers are climbable, and antennas can be installed without the need for cranes or lifts; if after the site survey it is determined that crane or lift is required, Contractor shall inform County with this requirement and provide a change order subject to the County's written approval and acceptance.

1.10 **Construction, Site, and Civil Drawings**

Contractor shall provide the standard drawing package for the microwave equipment listed in Exhibit A, Section 12. County is responsible for all other drawings required for this project.

1.11 **Cutover Outages**

Contractor estimates minimum outages on all ring hops, assuming ring protection is implemented; four (4) to eight (8) hours on all spur hops.

1.12 **Structural Analysis**

County shall be responsible for all structural analysis for all towers and antenna infrastructures.

1.13 **Performance Period**

Contractor shall conduct a 30-day performance period at the completion of the end-to-end testing. Contractor to shall add Ethernet test sets at various locations of the network to monitor for 30 days. Contractor to monitor the system performance through NMS.

1.14 **Battery Storage and Charging for projects that include batteries**

Storage Location

If the battery is not to be installed at the time of receipt, it is recommended that it be stored indoors in a cool [77°F (25°C) or less], clean, dry location. Do not stack pallets or cell terminal damage may occur.

The storage interval from the date of battery shipment to the date of installation and initial charge should not exceed six (6) months. If extended storage is necessary, the battery should be charged at regular intervals until installation can be completed and float charging can be initiated. When in extended storage, it is advised to mark the battery pallets with the date of

shipment and the date of every charge. If the battery is stored at 77°F (25°C) or below, the battery should be given a freshening charge within 6 months of the date of shipment and receive a freshening charge at 6-month intervals thereafter. Storage at elevated temperatures will result in accelerated rates of self-discharge. For every 18°F (10°C) temperature increase above 77°F (25°C), the time interval for the initial freshening charge and subsequent freshening charges should be halved. Thus, if a battery is stored at 95°F (35°C), the maximum storage interval between charges would be 3 months (reference ***Appendix B).*** Storage beyond these periods without proper charge can result in excessive sulphation of plates and positive grid corrosion which is detrimental to battery performance and life. Failure to charge accordingly may void the battery's warranty. Initial and freshening charge data should be saved and included with the battery historical records.

2. Planning and Design Services and Responsibilities

2.1 Project Management

Contractor shall provide a dedicated Project Manager (PM) to manage this project.

Project Management Responsibilities

Planning	
Develop project schedule for Contractor's engineers	Contractor
Develop project schedule for County's supporting vendors	County
Establish an action register	Contractor
Establish a communications plan	Contractor and County
Establish a change management plan	Contractor and County
Establish a risk management strategy	Contractor
Provide quality standards and procedures document	Contractor
Establish a resource management plan for Contractor resources	Contractor
Develop a responsibility matrix, detailing principle team members by function	Contractor
Provide details of County's principle team members by function	County
Provide details of County's single point of contact for Contractor	County
Execution	
Act as primary point of contact for County	Contractor
Finalize project terms and scope with County	Contractor
Chair meetings to assign tasks, evaluate progress and address issues	Contractor
Coordinate Contractor Networks' day-to-day activities through to project signoff	Contractor
Coordinate County's supporting vendors' day-to-day activities	County

Monitor progress against the agreed-upon project milestones	Contractor
Report on progress as agreed to in the communications plan	Contractor
Manage project risk through risk identification, quantification and mitigation	Contractor
Ensure the terms and conditions of the contract are complied with	Contractor
Closeout	
Manage project closeout activities	Contractor
Sign-off on closeout activities and final deliverables	County

Project Management Deliverables

Contractor shall provide the following deliverables:

- Project schedule
- Risk Management Strategy
- Change management plan
- Action register
- Communication plan
- Progress reports (as required)
- Refer to ***Appendix A*** for further details regarding PM's role

2.2 **Microwave Network Design**

Contractor shall provide copies of equipment datasheets/user manuals.

Microwave Network Design Responsibilities

Planning	
Microwave system requirements	County
Existing traffic, IP and NMS plans	County
Anticipated channel plan requirements	County
Preliminary system design during or after initial proposal	Contractor
Preliminary path calculations for selected Contractor Networks radios	Contractor
Design	
Final equipment list	Contractor
Final path calculations and path profiles	Contractor
Site specific diagram (RP's and wiring diagrams)	Contractor
DS0 traffic plans	County
DS1/DS3/OC3 traffic plans	County
IP traffic plans	Contractor
NMS plan	Contractor
Synchronization plan	Contractor
DC power calculations	Contractor
Traffic cut-over plan and method of procedure	Contractor
Field acceptance test plan	Contractor
Sign-off	

County sign-off on final network design (design freeze)	County

Microwave Network Design Deliverables

Contractor shall provide the following deliverables:

- Equipment list
- Design freeze package
- Refer to ***Appendix B*** for further details regarding Microwave Network Design

2.3 **Microwave Path Design**

- Path reliability: 99.999%
- BER: 10^6
- County exempt from FCC license fee

Microwave Path Design Services

Contractor shall provide the following services:

- RF interference paper study

Microwave Path Design Responsibilities

Planning	
Documents relating to tower or structural analysis and drawings	County
Documents relating to previous path surveys and frequency coordination	County
Historical path performance details on a per link basis	County
Path clearance objective for each path	County
Federal registration number (FRN) and username and password	County
Design	
Path surveys to confirm path reliability objectives	Contractor
Site elevation and coordinates	County
Existing antenna mounting structure description and information (tower type)	Contractor
Existing building description and information	Contractor
Site plan (drawing with major landmarks for location purposes)	County
Final path calculations and path profiles for each hop	Contractor
Identify locations of possible sources of spectral reflection	Contractor
Information concerning possible obstructions or obstacles	Contractor
Recommend antenna size, type, and mounting height	Contractor
Radio frequency coordination	Contractor
Tower permit application	County
Prepare and submit FCC license application (where applicable – Form 601)	Contractor
Prepare and submit environmental impact data	County
Provide required environmental approvals or permits	County
File FCC construction completion notice	Contractor
Sign-off	
Approve recommended antenna size, type and mounting height	County

County sign--off on final path design	County

Microwave Path Design Deliverables

Contractor shall provide the following deliverables:

- Microwave path survey report
- Frequency data sheets
- Refer to ***Appendix C*** for further details regarding Microwave Path Design

2.4 Project Engineering

Project Engineering Services

Contractor shall provide the following services:

- Floor plan for installation scope
- Traffic cutover plan
- RF cutover plan
- Field acceptance test plan
- Installation specifications
- Manage field installation

Project Engineering Responsibilities

Planning	
Documents relating to tower or structural analysis and drawings	County
Site access policies and procedures	County
Site access as required	County
Building/shelter/enclosure access as required	County
Design	
Site surveys	Contractor
Existing tower description and information (tower type)	Contractor
Existing building description and information	Contractor
Site plan (drawing with major landmarks for location purposes)	County
Environmental data (if required)	County
Flooring, ceiling, racking data, and requirements to mount new hardware	County
All power, existing and future, with breaker assignments	County
Recommendation for placement of new equipment	Contractor and County
Identify and define antenna mounting hardware	Contractor
Identify any grounding issues and recommend improvements	Contractor
Identify demarcation types and location between new and existing equipment	County
Existing waveguide dehydrator information and their associated cabling	Contractor
All structural information regarding power generator	County
Recommendation for any site or shelter upgrades	County
Recommendation for tower upgrades	County
Execution	

Coordinate day-to-day field install activities through to project signoff	Contractor
Monitor field installation progress against the agreed-upon project milestones	Contractor
Report on field installation progress as agreed to in the communications plan	Contractor
Ensure proper site readiness prior to the install start date	County
Coordinate change orders until project completion	Contractor
Coordinate system acceptance and project completion	Contractor
Coordinate finalization of project closeout drawings and documents	Contractor
Review quality checklists and photos for defects	Contractor

Project Engineering Deliverables

Contractor shall provide the following deliverables:

- Microwave site survey report
- Traffic cutover plan
- RF cutover plan
- Field acceptance test plan
- Installation specifications
- Project closeout package
- Refer to ***Appendix D*** for further details regarding Project Engineering

3. Installation, Integration and Testing

3.1 Installation Services

Contractor shall provide the following installation services:

- Antenna system installation
- Transmission line installation
- Indoor equipment and rack installation
- Antenna alignment

County shall provide the following installation services:

- Tower installation
- Shelter installation
- AC power equipment
- Ground installation

Not included: DC power equipment

3.2 Integration Services

Contractor shall provide the following integration services:

- Microwave equipment integration
- Dehydrator integration
- NMS integration

3.3 Testing Services

Contractor shall provide the following testing services:

- Station test
- Hop test

- System test
- Traffic cutover
- RF cutover

3.4 Installation, Integration and Testing Responsibilities

General project responsibilities	
Obtain all necessary environmental and public agency approvals/documentation	County
Obtain all necessary construction permits and documentation	County
Access to sites in accordance with the project schedule	County
Normal road access for all project related vehicles	County
Transport of Contractor supplied equipment to County warehouse	Contractor
Transport of Contractor supplied equipment to sites	Contractor
Transport of Contractor personnel to and from sites	Contractor
Safety and first aid material and supplies to Contractor personnel	Contractor
Site & civil services	
Leasing, zoning, permits and inspections	County
Soil analysis or provide report	County
Foundation design for tower/shelter	County
Site construction (demolition, grading, erosion control, drainage, etc.)	County
Civil documentation for existing shelters and towers	County
Structural design package required to support proposed antenna system	County
Structural analysis report for the existing and new antenna system	County
Site layout drawings, plot plans or applicable architectural blueprints	County
Locate and mark all site boundaries and features	County
Secure storage for all equipment including radios, antennas and racks for three (3) months	Contractor
Standard equipment packaging	Contractor
Unpack Contractor equipment and remove packing material from site	Contractor
Verify packing list to specifications	Contractor
Installation services	
Tower installation:	
Antenna system support structures: towers, monopoles and tripods	County
Ground resistivity measurements and report of newly installed ground system	County
Install tower foundation	County
Tower painting	County
Provide and install tower lights	County
Provide and install safety climb and safety climb ladder	County
Provide and install lightning rod	County
Provide and install platform	County
Provide and install footing hardware and penetrations for structure on rooftops	County

Adequate earth ground in accordance with EIA/TIE standard 222G	County
Connect tower ground to site ground, in accordance with EIA/TIA standard 222G	County
Provide and install standard tower leg pipe mounts.	Contractor
Provide and paint antennas to match structure or specific color	Not Included
Provide and paint lines to match structure or specific color	Not Included
Provide and install tower or rooftop pole mounts	County
Provide and install any required steel support members for side braces	Contractor
Provide and install specialized antenna mounts	Not Included
Provide and install standard face mounts	Not Included
All RF/microwave antenna mounting brackets	Contractor
Antenna feeder window/bridge and cable tray supports	County
Antennas and radomes at specified centerlines	Contractor
Ice shields at specified locations	Not Included
Cranes, man lifts, snowmobiles, ATV's, or special hoisting equipment	TBD after Surveys
Transmission Line Installation	
Waveguide ladders	County
Waveguide bridges	County
Rooftop sleepers for transmission lines and ground plates	County
Provide and install cable trays	County
Provide and install transmission lines	Contractor
Provide and install hanger kits and ground kits	Contractor
Penetrate building walls or roof and install waveguide ports and entry plates	County
Provide and install waveguide or coax boots at entry plates	Contractor
Provide and install lightning protector at entry points	Contractor
Provide and install conduit	County
Terminate and label waveguide or coax runs	Contractor
Shelter Installation	
Provide shelters, cabinets or enclosures	County
Provide and install shelter foundation	County
Shelter installation	County
Replace GPS receiver, cable and antenna at CoB2 Site	Contractor
Indoor Equipment and Rack Installation	
Provide and install cable ladders or trays	County
Provide and install new racks in specified locations	Contractor
Provide and install bracing supports	Contractor
Provide and install pressurization equipment	Contractor
AC/DC Power Equipment and/or Ground Installation	
Perform electrical (underground conduits, trenching, AC power source, etc.)	County
Provide and install ground ring	County

Provide and install generator and fuel tank	County
Provide and install AC circuit breakers to support Contractor's equipment	County
Provide and install AC feeds from AC distribution to charger or UPS equipment	County
Provide and install DC circuit breakers to support Contractor's equipment	Contractor
Provide and install charger racks	Not Included
Provide and install battery into charger rack or on floor as required	Not Included
Field Integration Services	
Integrate Contractor supplied microwave equipment	Contractor
Integrate rack ground to ground distribution in shelter	Contractor
Integrate DC wiring to specified distribution panels	Contractor
Integrate payload wiring to designated demarcation	Contractor
Integrate Ethernet wiring to designated demarcation	Contractor
Integrate alarm contacts to designated demarcation	Contractor
Integrate battery wiring to designated chargers	Not Included
Connect radio antenna ports to waveguide flex sections	Contractor
Set dehydrator pressure to 4psi	Contractor
Install and integrate NMS software into County's radio network	Contractor
Customize NMS alarm designations	Contractor
Testing Services	
Review and approve Contractor's field acceptance test plan	County
Station Test	
Perform grounding inspection	County
Perform equipment inspection	County
Perform DC power system test	Not Included
○ Measure charger floating/equalization voltages	Not Included
○ Measure voltages on each battery cell	Not Included
○ Verify charger/battery switching	Not Included
○ Verify 2% voltage drop to racks	Not Included
Dehydrator airflow and alarm tests	Contractor
Hop Test	
Perform antenna system test	Contractor
○ Perform a sweep test of antenna system over the bandwidth of the antenna.	Contractor
○ Perform a waveguide tap test	Contractor
○ Perform a 4-hour pressure test of the waveguide and antenna system	Contractor
Perform IRU inventory	Contractor
Perform transmit power output test	Contractor
Perform receive signal level test	Contractor
Perform receiver threshold (fade margin) test	Contractor
Perform Interference fade margin test	Contractor

Verify XPIC operation and feedhorn alignment	Not Applicable
Perform transmitter/receiver switching test	Contractor
Perform Layer 2 link aggregation test	Contractor
Perform adaptive modulation test	Contractor
Perform RFC2544 Ethernet testing: throughput, latency, and frame loss	Contractor
Perform Y.1564 Ethernet service activation testing	Not Included
Perform AUX alarm/data card test	Contractor
Perform channel bank test	County
Verify VF continuity/level at 1KHz	County
Verify operation of E/M signaling	County
Perform RAD DACS 4100 Factory integration, and field installation and test	Contractor
Perform IP phone test	Not Included
Perform order wire test	Not Included
Perform 1-hour BER test on the primary and standby radios (systems with TDM interfaces)	Contractor
Perform 12-hour BER test on primary radio and 4-hour BER test on standby radio (on Ethernet only systems) using Portal and the internal G.826 data capture routine.	Contractor
System Test	
Perform ring wrapping test	Contractor
Perform IP phone test	Not Included
Perform order wire test	Not Included
Perform network continuity test	Contractor
Perform ProVision element manager test	Contractor
Perform 12-hour BER test on primary radio and 4-hour BER test on standby radio (using DS1 loopback on TDM systems)	Contractor
Perform a network level Ethernet Ring Protection (ERP) to verify protection switching.	Contractor
Perform a network level MPLS traffic routing test to verify proper routing	Contractor
Traffic/RF Cutover	
Provide technical personnel familiar with existing equipment and cutover plan	County
Schedule cutover of all complete traffic immediately following installation	Contractor
Transfer circuit wiring	Contractor
Verify integrity of circuits being cutover	Contractor and County
Perform RF cutover	Contractor
Perform traffic cutover	Contractor
Thirty-day (30-day) system burn-in starts	Not Included
Final Site Acceptance Procedure	
Notify all parties involved of site completion	Contractor
Perform site installation inspection	County

Complete indoor quality checklist	Contractor
Complete tower quality checklist	Contractor
Submit final punch list of all deficiencies to be corrected by Contractor	County
Identify all critical punch list items	County
Review, agree and sign off on final punch list	Contractor and County
Sign off on Contractor's site installation checklist form	County
Final system acceptance procedure	
Sign off on Contractor's field acceptance test results	County
Resolution of County vendor issues affecting completion or project	County
Sign off on Contractor's installation completion report	County
Sign off on project acceptance based on acceptance criteria of project	County
Issue final invoice for services upon acceptance of the system	Contractor
Provide as-built drawings for Contractor provided equipment	Contractor

Installation, Integration, and Testing Deliverables

Contractor shall provide the following deliverables:

- Site installation completion report
- Quality checklists
- System installation completion report
- Field acceptance test report (completed)
- Punch list completion report
- As-built record sets
- Refer to ***Appendix F*** for further details regarding Installation, Integration, and Testing Services

4. Equipment Decommission

4.1 Equipment Decommission Services

Contractor shall provide decommission services for the following:

- Antenna system
- Transmission line
- Pipe mount
- Radio rack
- Dispose decommissioned equipment
- Not Included:
  - DC charger rack
  - Battery

5. Subcontractor

Contractor shall be utilizing Velex as their subcontractor to provide antenna installation and testing services.

6. Appendix A: Project Management Responsibilities

Contractor shall assign a representative to be the primary point of contact for this project ("Project Manager") for the duration of the project. The Project Manager (PM) shall work with County to facilitate effective resource management, escalations, approval processes, scheduling, communication, and reporting with Contractor's engineers and other designated vendors as needed. The PM is responsible for maintaining control of the project and assuring compliance with the project and County's specifications. Contractor shall not be responsible for the resolution of County's vendor issues affecting the completion of the project.

Contractor shall conduct face-to-face communication and on-site meetings with the County, some activities that do not require face-to-face contact shall be performed at the Contractor's office. It is the responsibility of the Contractor to communicate to the County when these activities that do not require face-to-face contact shall occur.

Project Schedule

The project schedule for Contractor's engineers and sub-contractors, and for County's supporting vendors shall be developed (or updated if a schedule is included with this proposal) and maintained in Microsoft Project and shall identify project deliverables, key milestones, resource assignments, and track project progress against each milestone. County and Contractor shall review and mutually agree to the project milestones and deliverable dates prior to the execution of any services on the project. A copy of the project schedule will be available upon request in .pdf or .mpp format.

It shall be the responsibility of County to track and deliver against all County internal (including County's sub-contractors) milestones. The overall project plan generated by Contractor's PM shall show major deliverable milestones, but not internal milestones of the County.

Communication Plan

Establishment of a communications plan shall be done in accordance with the principles of project management established by the Project Management Institute (PMI®) unless otherwise agreed to. The plan shall involve representatives from Contractor and County and any other entities as mutually agreed between the parties for project kickoff meetings, periodic progress meetings, or problem escalations as needed. The plan shall include the location and frequency of any such meetings, the format for formal communication and meeting minutes, attendee or distribution lists with contact details, methods of communication, and escalation and management level lists.

County shall make appropriate staff available for regular consultation and meetings with Contractor's PM.

Change Management Plan

Establishment of a change management plan shall be done in accordance with the principles of project management established by the Project Management Institute (PMI®). Each party shall work closely with the other to manage any

scope changes through the term of the project and understand their impact on the project performance from a cost, quality, and schedule perspective. Any such change may be subject to a change order fee and shall be communicated to County prior to the implementation of the change. Any change order approvals shall be submitted in writing.

Quality Standards and Procedures
Quality standards and procedures documents will be provided by County of San Mateo.

Resource Management Plan
Establishment of a resource management plan shall be done in accordance with the principles of project management established by the Project Management Institute (PMI®), identifying principle team members by function, including backup resources (if required).

Closeout Activities
During the project closeout, contractor shall manage all project closeout activities and County shall review all project closeout documents and final deliverables.

County Responsibilities
County of San Mateo shall:

- Provide details of County's principle team members by function during the project kickoff meeting.
- Provide details of County's single point of contact during the project kickoff meeting.
- Provide all other relevant documentation or resources to assist in gathering information.
- Provide access to sites, shelters, buildings, enclosures, facilities or any other areas as required.
- Provide updates as necessary of any site readiness issues to be resolved prior to start of work. This includes, and is not limited to, permitting, leasing, zoning, insurance, etc.
- Provide security clearances and/or escorts as required for field survey and installation activities.
- Provide access to pertinent databases, planning requirements, including strategic plans, expansion scenarios, growth projections, introduction of new services and wireless technology.

7. Appendix B: Network Engineering

Microwave System and Network Design
Contractor shall provide a Network Engineer who oversees the network and provides the overall technical direction of the system design. The Network Engineer shall work with the County to ensure system integrity, verify that all sub-systems and Contractor furnished OEM equipment is compatible, and that the desired performance of the system is realized.

The network design portion of the project consists of three phases:

1. Preliminary design
2. Final design
3. Design freeze

Preliminary Design Phase

During the preliminary design phase, the Network Engineer shall gather data to establish the design criteria and any special County requirements that need to be incorporated into the final design. The Network Engineer shall review and translate the system configuration into specific hardware requirements. Equipment selection shall be based on the requirements, input and requests from County, functionality of the equipment, and recommendations from the Network Engineer. Contractor shall provide County with a summary of the preliminary system design prior to commencing field surveys. All preliminary designs are subject to change. Changes can include, but are not limited to changes based on:

1. Survey results
2. Vendor shortages or long lead times
3. County requests
4. Engineering recommendations

Design Finalization Phase

After receipt of purchase order and the project kickoff meeting, Contractor and County shall enter into the design finalization phase. During this phase, the Network Engineer shall incorporate any required changes stemming from the path and/or site surveys into the design and confirm the final design details. Changes can include but not limited to:

1. Antennas (types, sizes, models, quantities, and mounts)
2. Waveguide (types and lengths), waveguide accessories and dehydrators
3. Power systems, cabling, and other materials that could not be finalized prior to conducting the field surveys

During this phase, County may also request changes to the system design if the changes fall within the original scope and hours of the project. Any changes outside of the original scope or agreed schedule are subject to review and acceptance by Contractor to determine the impact and cost on the overall project.

Contractor shall provide a formal submission detailing the final system design and equipment list and highlight changes needed to the preliminary design. County shall review the data and schedule a meeting, if necessary, to discuss any concerns. If no concerns are noted, it is County's responsibility to approve the final design in writing (email is acceptable) before the design is frozen and equipment is placed on order (unless otherwise agreed to in Exhibit A-Services or with the Project Manager). Any delay in the approval of the final design could result in a delay in material delivery to the field. This might require a review by County and Contractor of the project schedule and deadlines.

Design Freeze Phase

As part of the Design Finalization Phase, a date shall be set for the design freeze at which the final design and all changes must be approved and accepted by both parties. Following the design freeze, the Bill of Materials and documentation shall be submitted to Contractor's factory and the system shall be scheduled for manufacturing. The Network Engineer shall concurrently review all design documents and finalize any traffic plans, NMS plans, synchronization plans, traffic cutover requirements, as well as any special factory and field acceptance testing requirements for the project. During the Design Freeze Phase, the design is frozen and no further changes to the system design shall be accepted without a formal approved change order and reevaluation of the project and delivery schedules. Refer to the project schedule for details on the planned start and finish dates for each of these phases.

Deliverables

For a full list of Contractor's microwave design deliverables, refer to section Microwave Network Design and Deliverables.

1. The equipment list refers to the final bill of material ("BOM")
2. The design freeze package refers to the final path calculations, path profiles, rack profile and system drawings, traffic plans, IP plans, NMS plans, synchronization plans, and/or DC power calculations

8. Appendix C: Transmission Engineering

Microwave Path Design

Contractor shall provide a Transmission Engineer who oversees transmission and ensures the delivery of the best possible network solution by providing the technical direction for the over-the-path RF performance of Contractor's system implementation. All microwave paths designs are preliminary, pending final path surveys and frequency coordination. This includes:

1. Antenna selections, antenna centerlines, and antenna mounts
2. Total transmission line lengths
3. Path calculations and profiles
4. The size, type, quantity and configuration of each component

Equipment proposals are simply a reflection of these preliminary designs and subject to change. It is further understood that any changes to existing or proposed antenna centerlines could justify the need for tower stress analysis or, if modification is impractical, construction of a new tower. Any such requirements shall be the responsibility of County unless otherwise stated in the Agreement.

In the event that County elects not to use Contractor to perform path surveys, the performance of the microwave system shall not be guaranteed by Contractor and it shall be up to County to resolve any path reliability or obstruction issues. Refer to the ***Warranty of Path Engineering Services*** section below for further detail.

In the event that County selects Contractor to perform path surveys, a formal submission detailing the results of the path survey and highlight changes needed

to the preliminary design will be submitted to County. County shall review the path survey data and schedule a meeting, if necessary, to discuss any concerns or alternate means of providing path continuity/system reliability. County shall communicate any feedback to Contractor before the final system design approval. Once County accepts and approves the path survey data, Contractor shall proceed with frequency coordination (if applicable).

Microwave Path Survey, Frequency Planning and Licensing

Contractor shall provide the following microwave path survey services:

1. Identify geographical location of sites and antenna, waveguide length and tower requirements
2. Verify path clearance objectives for each of the paths from existing or new tower locations
3. Document obstruction, critical points, and reflection points in each of the paths
4. Verify tower coordinates and site elevations.
5. Establish coordinates and height requirements for new towers, as needed for governmental agency registration and licenses filed by County
6. Confirm antenna centerlines and waveguide length requirements. Catalog antennas on the existing structures noting any space limitations in the survey report. Contractor's engineer shall review the tower for new antenna design space limitations specific to this project only but shall not perform a complete tower audit
7. Perform frequency coordination based on available FCC records to reduce the potential for interference between internal or external radio sources on a given system or network.
8. Contractor, upon receipt of County's written authorization, shall prepare the FCC License Application Form 601 with the appropriate technical data. Information such as site location, radio type, and frequency shall be listed. Contractor shall complete and submit the Construction Complete Form 601 online via FCC Universal Licensing System ("ULS").
9. File Antenna Structure Registration ("ASR") form for towers over 200 feet.

The results of the survey shall be utilized by Contractor for preparation of final performance calculations, frequency coordination, government licensing, and tower registration requirements. In the event where Contractor shall not be performing the path survey, County shall provide all the documents needed for Contractor to complete the frequency coordination, licensing, and final system design. Contractor shall not be held accountable for validating the accuracy of the information provided by County and assumes no responsibility in any inaccuracies of any part of the path engineering based on the information provided by County or any contact affiliated with County. Any corrective action required as a result of this shall be billed to County a billable change order.

Survey Procedures

Preliminary path profiles are drawn based on the supplied site coordinates and

contour information extracted from the best available topographic mapping. A field site survey is conducted to verify site coordinates and elevations based on North American Datum 1983 ("NAD83") and gather information related to the proposed radio equipment and antenna locations, site access, and site development constraints. A field path survey is then conducted to verify path profile elevations, measure all natural and manmade potential obstructions and assess the reflective potential of all natural and manmade surfaces. Antenna centerline heights were calculated for the proposed frequency band by applying suitable clearance criteria based on the propagation characteristics of the geographic area. The path survey report is considered to be a representation of the information gathered in the field and as such, reflects a snapshot in time at the time of the survey. It is not intended to show the final as-built configuration if any of the parameters were changed or updated after the survey report has been released.

Path calculation sheets are then generated for each hop, based upon the recommended centerline heights. Antenna sizes and the choice of propagation protection diversity are chosen to meet the required fade margin and the desired path propagation reliability. Propagation outage and reliability calculations are based on the Vigants model (ref. "Space Diversity Engineering", BSTJ, 1/75).

Design Criteria

Path clearance criteria must be established for each path on the basis of total system performance objectives, economic considerations, and careful analysis of local atmospheric conditions derived from published climatological data, where available, and reported microwave transmission experience pertinent to the area. Antenna heights much greater than actually needed cause an unwarranted increase in system cost, and on paths with significant ground reflections, this can increase the exposure to multipath and ground reflection signal fading. It is desirable to locate the antennas high enough so that even under severe super-standard atmospheric refractive conditions (surface ducting) there is adequate clearance such that signal entrapment does not significantly degrade the fade margin of the path or generate excessive multipath fade activity. The choice of clearance criteria for a microwave path is a balance between cost and performance.

The path clearance criterion as applied to a given geographic area is a function of the degree and direction of atmospheric beam bending and can conveniently be defined by the equivalent earth radius K factor:

$$K = \frac{Effective\ Earth's\ Radius}{Actual\ Earth's\ Radius}$$

The median propagation value of K = 4/3 allows the normal microwave horizon to be slightly extended when compared to the optical horizon; however, under certain meteorological conditions (for example, during nighttime super-refractivity usually associated with temperature inversions) the value of K increases to 2 or greater for periods of several minutes to several hours. This increases the path

clearance and results in the heavy multipath fade activity seen on some reflective paths and antenna decoupling power fading on others.

Clearance Criteria

The criteria used to design a radio path in regions where the C-factor is equal to or less than 1:

Main to Main:

- 100% first Fresnel zone radius over K=4/3, or
- 60% first Fresnel zone radius over K=1, whichever is greater

Main to Diversity:

- 60% first Fresnel zone radius over K=4/3 (Not Applicable)

The criteria used to design a radio path in regions where the C-factor is greater than 1:

Main to Main:

- 100% first Fresnel zone radius over K=4/3, or
- 30% first Fresnel zone radius over K=2/3, whichever is greater

Main to Diversity:

- 60% first Fresnel zone radius over K=4/3 (Not Applicable)

Microwave Path Performance Calculations and Warranties

The microwave path design models most frequently employed within the industry (e.g., Vigants, and ITU-R P-530) provide a reasonably accurate (and therefore usually guaranteed) estimate of the cumulative time a path will be out of service due to random atmospheric multipath fading under normal atmospheric conditions. **These models do not (and cannot) accommodate abnormal, unusual, anomalous, or otherwise unpredictable conditions of weather or atmospheric refractivity.**

Microwave Frequency Engineering/inter-system Interference Analysis

Contractor shall partner with Comsearch, a CommScope company, to provide cost-effective frequency planning and FCC licensing services for radio communications systems (if required). The planning software used, considers specific operating parameters of both the proposed microwave system and the environment microwave systems (license and proposed) to properly consider the interference potential of the new path or system. Parameters and data elements incorporated into the modeling include, but are not limited to:

- Antenna type, antenna height, elevation, antenna radiation pattern
- Receiver filter performance
- Terrain
- Radio modulation
- Path orientation
- Receiver threshold

These elements are required to accurately predict specific interfering levels into and from the existing microwave systems. The accuracy of the calculations is ensured by real-time maintenance of the Comsearch point-to-point microwave, earth station, radio equipment, antenna, interference objective, and contact database.

Microwave Frequency Selection

The interference analysis performed on the microwave system identifies available frequencies considering existing and proposed systems found in the Comsearch database. When applicable, an analysis of the systems in the adjacent bands can be done to ensure the microwave system does not receive unwanted threshold degradation. In bands shared with satellite systems, an analysis of potential interference with earth stations and with the geo-stationary satellite orbit can also be done. Additionally, co-located or nearby transmitters already licensed in the required frequency band can be identified in order to reduce the possibility of "bucking" an existing high/low frequency plan that could increase the possibility of receiver overload or reflective interference from a nearby system.

Microwave Frequency Coordination and FCC Licensing

The majority of microwave bands subject to FCC Rule Part 101 require prior coordination with existing licensees. Contractor shall partner with Comsearch to perform the frequency coordination and FCC licensing on behalf of the County (if required). The procedure will include notification of the technical parameters of the proposed system to all existing and proposed licensees in the area and frequency band of operation. Frequency coordination will also be performed with Canadian and Mexican authorities in border areas when necessary. By FCC rule, recipients are given 30 days to respond, or in some cases an expedited response can be requested.

Upon completion of the prior coordination process, documentation required to satisfy FCC Rule Part 101.103 (d) can be prepared on behalf of the County. This will include any necessary exhibits, including supplemental showings required upon submittal of the requested license application. The FCC filing process includes:

- Filing of the FCC Form 601 microwave application upon written approval from County and providing an electronic copy of the application to County via email.
- Tracking the status of the application until the license is granted by the FCC. Amendments will be handled expeditiously on behalf of County for any questions or concerns from the FCC.
- Email notifications to the licensee when the license is granted by the FCC.
- Filing of the required completion of construction notification with the FCC upon written approval from the licensee and notification of the filing via email.

Special Considerations

On all microwave radio paths traversing urban areas there exists the possibility of multiple on- and off-path structural reflections which generate long-delayed echoes, as well as terrain scatter RF intra- and inter-system interference. Long delayed, low-level echoes have no effect on digital radio performance; however, the terrain scatter mechanism cannot be accurately predicted nor precisely measured without an extensive and expensive field trial. Consequently, this

mechanism is specifically excluded from all current industry-wide path survey and frequency coordination performance guarantees.

The structure supporting the microwave antenna can take many forms. The antenna is most often mounted on a tower but can be mounted on a variety of structures such as roof tripods, penthouse walls, wooden telephone poles, or metal monopoles. It is recommended that County conduct a structural analysis of the support structure to determine if the structure will support the additional loading imposed by the antenna and its mount. The structure must also meet the twist and sway requirements per EIA/ANSI 222G.

Site Access

Access to work sites shall be made available by County for a minimum of 10 hours per day, 5 days per week or per the agreed schedule in the project plan. All roads leading to work sites shall not require more than a 4-wheel drive vehicle unless stated otherwise and agreed to by both County and Contractor. Any delays or additional cost caused by poor road conditions or site access issues not discussed prior to the start of the surveys shall be billed to County as a billable change order and could have a negative impact on the project completion schedule.

FCC Rules for Filing Accuracy

CFR 47, Part 1.929 specifies that filing accuracy for site coordinates shall be (+/-) 1" latitude and longitude, and for ground elevation (+/-) 1 meter (3.28 ft.). Part 1.929(k) (covering modification of FCC licenses) specifies that any change in site coordinates >5" latitude or longitude shall require prior authorization and re-coordination. Therefore, wherever Contractor's survey results deviate more than (+/-) 5" latitude or longitude, or more than +3.28 ft. site elevation, frequency re-coordination will be recommended.

Terms and Conditions

When Contractor performs reliability calculations or path studies (path profiles from mapping or digitized data only) based solely on information supplied by or on behalf of the County, these calculations and studies are provided solely for budgetary purposes and shall not be construed as or be used for an installable design.

When conducting a path survey, Contractor shall verify site coordinates and ground elevations, and record trees and man-made fixed obstructions on the path. This information shall be recorded on the profile for that particular path. Contractor shall assign an appropriate growth factor to tree heights.

When Contractor performs frequency planning based, in part or its totality, on data provided by the County at the time of the study, Contractor shall not be responsible for any interference case that might arise due to errors or omissions in such data. As the usage of microwave bands increase and there is more sharing with satellite services, it may be necessary to perform frequency interference studies and additional path surveys (to determine blockage) to

alleviate the possibility of interference from satellite earth stations.

Warranty of Path Engineering Services

Contractor warrants that the installed radio communication path shall conform to County's multipath performance reliability objectives when Contractor has performed the path survey, recommended the path design, and implemented such recommendations. This warranty is for a period of fifteen (15) months from the date of the survey or one (1) year from the date of installation of the microwave path, whichever expires first. All Contractor's field activities and path propagation analysis shall utilize current hardware, software, engineering practices and judgment with the goal of meeting normal Path Loss, as defined in TIA/EIA Standard RS-252-A.

Contractor is not responsible for paths that it does not survey, nor for changes in path design beyond those specifically allowed in the path survey report or in writing after the field survey is completed, including but not limited to:

- Any change in path design
- Any movement in site locations
- Any building or other structure built on-path after date of survey
- Any disturbance of the terrain which may cause blockage or reflection
- Any additional frequency interference source
- Any change of available antenna mounting space on tower

Any one of these changes listed will nullify the warranty, and County shall in such case bear the total cost of determining that such change was the cause.

Contractor shall not be responsible for degraded path performance when such degradation is due to such anomalous propagation conditions as:

- Long-term loss of fade margin due to antenna decoupling misalignment caused by widely varying k-factor changes
- Long-term loss of fade margin due to atmospheric boundary layering ("ABL") causing wave front defocusing (beam spreading), signal entrapment (blackout fading), ducting, and other such occurrence
- Excessive rain outage rates beyond the published crane and/or chart data used in the calculation
- Degradation resulting from certain types of multipath interference attributed to unidentifiable off-path terrain features or structures
- Any other technological or atmospheric condition not foreseeable through the exercise of prudent engineering knowledge and judgment.

Additionally, Contractor shall not be responsible for degraded path performance when:

- Non-Contractor's radio equipment is installed on a surveyed path
- Contractor's radio equipment is not installed by Contractor
- Existing antenna and waveguide system are used without test and inspection performed by Contractor.

Contractor designs the microwave path based upon engineering practices and

standards common to the industry. When path loss or reliability objectives are not achieved, County's sole remedy, and Contractors' exclusive liability in connection with path engineering, shall be that Contractor shall provide incremental labor and material to optimize the antenna system to meet the requirements created during initial installation.

Where anomalous propagation is suspected in an installed microwave path, Contractor shall work with the County to obtain reasonable evidence that such condition exists. The total retroactive costs for such study shall be the responsibility of the County, and Contractor shall provide in-office engineering support at County's expense. The cost of relocating towers, antennas, passive reflectors, or other measures required to remedy this type of problem shall solely be the responsibility of the County.

Warranty Limitations

THE LIMITED WARRANTY CONTAINED IN THIS EXHIBIT A CONSTITUTES CONTRACTORS' SOLE AND EXCLUSIVE LIABILITY HEREUNDER AND COUNTY'S SOLE AND EXCLUSIVE REMEDY FOR DEFECTIVE OR NON-CONFORMING EQUIPMENT, SERVICES, AND SOFTWARE MEDIA OR LICENSED PROGRAMS. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES (EXCEPT AS TO TITLE), WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, ANY IMPLIED WARRANTY OR CONDITION OF FITNESS FOR A PARTICULAR PURPOSE, OR ANY WARRANTY OR CONDITION ARISING OUT OF COURSE OF DEALING, COURSE OF PERFORMANCE, OR CUSTOM OR USAGE OF TRADE. COUNTY AGREES THAT NO CIRCUMSTANCE CAUSING COUNTY'S EXCLUSIVE AND LIMITED REMEDIES TO FAIL IN THEIR ESSENTIAL PURPOSE SHALL INCREASE OR EXTEND ANY CONTRACTOR WARRANTY. THE TOTAL LIABILITY OF CONTRACTOR AND ITS LICENSORS UNDER THIS WARRANTY SHALL IN ANY EVENT BE SUBJECT TO THE LIMITATIONS IN THIS EXHIBIT A.

ANY WARRANTY CLAIM NOT SENT TO CONTRACTOR IN WRITING DURING THE APPLICABLE WARRANTY PERIOD IS WAIVED BY COUNTY. REPLACEMENT EQUIPMENT, SERVICES, SOFTWARE MEDIA AND LICENSED CONTRACTOR PROGRAMS ARE WARRANTED ONLY FOR THE BALANCE OF THE UNEXPIRED PORTION OF THE ORIGINAL WARRANTY PERIOD, IF ANY.

COUNTY IS EXPRESSLY NOTIFIED THAT UNDER NO CIRCUMSTANCES SHALL CONTRACTOR BE LIABLE FOR (A) ANY SPECIAL, INDIRECT, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY PARTY, INCLUDING THIRD PARTIES, EVEN IF SUCH DAMAGES ARE FORESEEABLE, OR (B) LOSS OF REVENUE, LOSS OF PROFITS, LOSS OF BUSINESS, LOSS OF USE, LOST SAVINGS, OR LOST OR CORRUPTED DATA, OR (C) LOSSES RESULTING FROM SYSTEM SHUTDOWN, FAILURE TO ACCURATELY TRANSFER, READ OR TRANSMIT INFORMATION,

FAILURE TO UPDATE OR PROVIDE CORRECT INFORMATION, SYSTEM INCOMPATIBILITY OR PROVIDING INCORRECT COMPATIBILITY INFORMATION OR BREACHES IN SYSTEM SECURITY EVEN IF CONTRACTOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION SHALL APPLY TO ANY CLAIM OR CAUSE OF ACTION WHETHER IN CONTRACT OR TORT (INCLUDING NEGLIGENCE, STRICT LIABILITY OR BREACH OF WARRANTY).

IN NO EVENT SHALL CONTRACTORS' TOTAL LIABILITY TO COUNTY OR ANY PARTY CLAIMING THROUGH COUNTY EXCEED THE LESSER OF ONE HUNDRED THOUSAND UNITED STATES DOLLARS ($100,000.00 USD) OR THE ACTUAL SALES PRICE PAID BY COUNTY FOR ANY EQUIPMENT, SOFTWARE OR SERVICES SUPPLIED UNDER THIS SOW.

THIS SECTION SHALL SURVIVE THE TERM OR EXPIRATION OF THE AGREEMENT. COUNTY AGREES TO INDEMNIFY, DEFEND, AND HOLD HARMLESS CONTRACTOR AGAINST ALL LOSS OR LIABILITY FROM CLAIMS BY COUNTY OR A THIRD PARTY ARISING OUT OF OR RELATING TO COUNTY'S INSTALLATION, OPERATION, OR MISUSE OF THE EQUIPMENT OR LICENSED PROGRAMS, WHETHER ON ACCOUNT OF NEGLIGENCE OR OTHERWISE.

9. Appendix D: Project Engineering

Microwave Site Design

The Contractor's representative overseeing implementation ("Project Engineer") shall perform field site surveys to verify that telecommunications equipment can be installed, powered, and commissioned effectively at each site, antennas, waveguide and accessories can be connected to radios (towers, shelters and buildings), and County traffic, alarms and dehydrator lines are fully engineered.

Microwave Site Survey

The microwave site survey is intended to gather data and identify the gap(s) between the site's present state and the site readiness for equipment installation, document any visible issue with the existing infrastructure and equipment that would pose a quality or safety issue during installation, gather environmental data and requirements for telecommunication equipment to function properly (including but not limited to HVAC, temperature, humidity, the general state of the facility as well as seismic evaluation and compliance if required), record flooring, ceiling, racking data and requirements to mount new equipment including floor plans, relay rack profiles, aisle numbering plans, and ceiling hangers, ladders, and anchor materials required to meet quality and safety standards.

The survey is also intended to record AC, DC, grounding (as is and to be), and breaker assignments and ensure power and grounding standards are met, identify demarcation types and location between new and existing equipment as well as the type of termination and the details required to terminate to the County provided equipment, identify existing radio equipment (fixed and mobile) as well

as their operating frequencies, record existing waveguide, dehydrator component and their associated cabling, identify all required or existing tower structures, mounting structures, antenna mounting types, waveguide ladder systems, entryway into telecom shelters, and energy sources.

The results of the survey shall be published and released in a site survey report and shall be utilized by Contractor for preparation of final power calculations, waveguide requirements, field OEM requirements, installation specifications, field test plans, and traffic cutover plans. In the event where Contractor shall not be performing the site survey, County shall provide all the documents needed to Contractor to complete the site engineering and final system design. Contractor shall not be responsible for validating the accuracy of the information provided by County and assumes no responsibility in any inaccuracies of any part of the site engineering and microwave site design when such design is based on the information provided by County or any contact affiliated with County. Any corrective action required as a result of this shall be billed to County as a billable change order.

Microwave Site Access

Access to work sites shall be made available by County for a minimum of 10 hours per day, 5 days per week or per the agreed schedule in the project plan. All roads leading to work sites shall not require more than a 4-wheel drive vehicle unless stated otherwise in this Agreement and agreed to by both County and Contractor. Any delays or additional cost caused by poor road conditions or site access issues not discussed prior to the start of the surveys shall be billed to County as a billable change order and may have a negative impact on the project completion schedule.

Field Installation Management

Contractor shall manage the day-to-day activities of the field installation with support from County to ensure the project remains on schedule as per the agreed project schedule.

10. Appendix E: Installation, Integration and Testing

The installation, integration, and testing services include design-supported methodologies, product expertise, and field-proven processes to help ensure a quality installation and testing of critical system paths and hardware so that the network performs according to its design. Contractor shall designate a primary point of contact to answer any County questions, provide guidance, and address issues specific to this service.

This Agreement is based on the Contractor's standard installation schedule of 10-hour days, six (6) days per week. Contractor shall adjust these services for work week schedules outside of Contractors' standard. Installation work performed during maintenance windows is not included in this Agreement unless specifically identified. All work will be done in accordance with Contractors' best practices guide.

Scope

Delivery of this service shall utilize the design documentation developed as part of the planning and design phase. Field crews shall utilize this documentation to:

- Install antenna systems
- Install transmission lines
- Install indoor microwave equipment, racks and components
- Perform antenna alignment
- Perform system integration
- Perform system testing

System implementation is predicated upon completion of civil construction and complete site readiness. Antenna, waveguide and equipment installation activities shall be performed at the same time on a per-site basis. As part of the delivery of this service, Contractor may choose to integrate equipment at the manufacturer's location to minimize onsite installation time and provide a common point for quality assurance inspections. If staging areas are utilized as part of the project, equipment and materials shall be delivered from these facilities to site by the installation crews. It is recommended that County provide maintenance technicians during any service affecting work.

The successful completion of all installation, integration, and testing services are based on uninterrupted, contiguous-site installation and testing. Additional mobilizations are not included in the pricing and project schedule. If installation is delayed due to inclement weather, inaccessible sites(s), incomplete site preparation, or construction, the following charges may apply and will be billed to County as a billable change order:

- Standby time for antenna installation teams shall be charged at a rate of $1,220 per person per day.
- Standby time for radio teams shall be charged at a rate of $1,225 per person per day.
- If re-mobilization of the installation crew is necessary, then a two-week advance notice is required.
- Re-mobilization shall be billed on a time-and-expenses basis.
- Service costing assumes use of 4-wheel drive vehicles for all project related vehicles. Additional requirements such as ATVs may require additional service costs.
- If the field crew(s) is required to work out of contiguous sequence due to conditions beyond the control of Contractor, a charge equal to one day for each crew person shall be assessed to the County for each occurrence.

Site Access

Access to work sites shall be made available by County for a minimum of 8 hours per day, 5 days per week or per the agreed schedule in the project plan. All roads leading to work sites shall not require more than a 4-wheel drive vehicle unless stated otherwise is this Agreement and agreed to by both County and Contractor. Any delays or additional cost caused by poor road conditions or site access issues not discussed prior to the start of the installation, integration or testing

services will be billed to County as a billable change order and could have a negative impact on the project completion schedule.

Site Services
All work permits, public agency approvals, leasing agreements, zoning permits or inspections required at each site, soil analysis, foundation design, civil documentation for existing shelters or towers, architectural blueprints, plot plans, structural analysis for new or existing antenna systems, location of all site boundaries and features (including locating and marking tower location, true North, property boundaries, paved areas, landscaping, fences and any other underground/overhead obstruction which could interfere with construction and access), and/or other related documentation for this project shall be obtained, conducted, completed and made available to all parties involved prior to the start of any installation, integration or testing services. All other construction and installation work shall be conducted in accordance with local city, county, state, and government laws and regulations.

All equipment including radios, antennas and racks shall be stored by County in a secure location at the site or at a designated location. County shall be responsible for the loss of any equipment, tools, or personal belongings from any secured location provided or monitored by County.

Installation
County shall verify that each site is ready for installation and commissioning activities, including County supplied equipment installation and power up prior to the start of any such services and shall be responsible for any delay caused or cost incurred due to sites not being ready, as stated in the project scope of this Agreement.

An inspection shall be performed with County after completing the physical installation. Workmanship deficiencies shall be noted on a punch list for immediate correction. This inspection is not intended to verify operation of the new system or suitability of components, but rather to inventory and document that all equipment and materials from the schedule of values are installed to acceptable workmanship quality standards. Site drawings shall be reviewed and red-lined to reflect the installed condition.

Testing
Test crews shall begin work immediately after installation is complete. Testing, based on a standard set of Contractor test cases, shall be performed on all provided equipment to confirm configuration, operation and manufacturer's specifications. Test data shall be recorded on field test sheets, by technical field personnel who shall also be responsible for documenting test results and any changes made to the design documentation.

The test crews shall be trained on the equipment and utilize test equipment to perform all tests. Test equipment shall have valid calibration certifications, which can be verified prior to commencing any tests. It is recommended that County

take the opportunity to have their maintenance technicians witness or participate in field commissioning testing to gain on-the-job training and experience on the new system components.
Commissioning tests shall consist of a set of standard Contractor test cases and include turn-up and performance verification tests and circuit tests to verify end-to-end continuity and equipment operation as well as any other tests documented in the field acceptance test plan. The field acceptance test plan shall be approved and agreed to by Contractor and County prior to test execution. Test results shall be recorded on field test data sheets and submitted to County. Refer to the field acceptance test document for details on the test to be performed.

System tests shall be performed on a logical section/loop of the system. The system tests shall be designed to demonstrate performance and functionality of system features as-well as end-to-end operation of individual circuits/services. System test results shall establish benchmark system performance and operation prior to cut-over and acceptance. The test data sheets prepared during commissioning and system testing shall become the base line document for maintenance and performance evaluation of the system over an extended period of time. County shall be required to review the commissioning and acceptance testing and results and red-lined drawings and provide approval of the data and authorization to proceed with cut-over activities.

Traffic Cut-over
Cut-over activities are anticipated to occur as DC, antenna and radio sub-systems are implemented. The Commissioning and system-level test activities verify that the new system is ready to accept traffic. Preparation, planning, logistics, and technical support are the critical elements in transferring existing services to a new system. County infrastructure is utilized for control of mission critical infrastructure; therefore, processes must also be put in place to minimize interruptions as well as to restore the original service in the event of unforeseen situations.

Safety
The health and safety of all individuals, whether in the field, plant or office, takes precedence over all other concerns. Management's goal is to prevent accidents and to reduce personal injury and occupational illness and comply with all safety and health standards. A code of safe conduct is important to the efficiency of operations. To the greatest degree possible, County shall provide physical safeguards required for personal safety and health in keeping with the highest standards. Contractor requires a written report from County for all accidents and incidents, no matter how small.

Safety and first aid material and supplies shall be provided to all Contractor construction and installation personnel or made available at each site for the duration of this project. All safety and first aid material shall be stocked at acceptable levels and shall have not exceeded the expiration dates where applicable. County shall be responsible for providing Contractor with the location and phone numbers of all local emergency agencies.

11. Appendix F: Assumptions and Exclusions

The following assumptions shall govern the delivery of the project management service:

- This Agreement is based on County completing all items set forth in this Agreement as being County's responsibility to ensure site readiness.
- Any inaccuracies in FCC data may drive additional services costs during field implementation. In addition, any other troubleshooting tasks related to frequency interference issues that are not directly attributable to Contractor are subject to additional service fees at rates define in this Agreement.
- All equipment interconnections or termination points, unless specified otherwise, are estimated to be fifty (50) feet. This project does not include any cabling between buildings, rooms, or floors, unless specifically identified in this Agreement.
- County provided construction drawings shall have sufficient details for Contractor engineering to order antenna mounting or any other related material required. Any re-engineering to provide correct mounts or material required by Contractor may increase cost to County.
- Contractor shall not be responsible for managing County project responsibilities and deliverables.
- Contractor shall not be responsible for the condition of existing equipment or the deficiencies of non-Contractor provided labor. Only the labor addressed in this Agreement shall be provided by Contractor.
- On-site technicians shall decline any County request for work outside the scope of work defined and agreed upon in this Agreement unless it is addressed in a change order.
- Contractor proprietary documentation used by service delivery teams to perform this service is not available to County.
- Contractor shall not provide proprietary information on methods, procedures, or tools to perform the services in this Agreement.
- Contractor shall not perform any and services that are not specifically described within this Agreement as being provided by Contractor.
- Contractor shall not be responsible for the resolution of other vendor issues affecting the completion of the cutover. Contractor can provide guidance and support to County in resolving interoperability issues, where applicable.
- Contractor shall not repair equipment not in the engineering drawings. Equipment requiring repair that is not included in the engineering drawings but is still under warranty must follow Contractor's repair and return procedures.
- Additions or changes to ironwork, cable racks, or fiber ducts are not included and can be quoted separately after site visit information is collected.
- Contractor shall comply with all applicable County Safety and security policies and procedures.
- Contractor shall not charge the following expenses to this engagement namely: airfare, lodging, mileage, meals, photocopies, tolls and parking, and travel time.

- When applicable, Contractor shall apply and secure the required security clearances from the County and Contractor's resources shall comply with the County's minimum background check requirements.
- When applicable and if requested by the County, Contractor to provide all applicable licenses and license numbers, certificates relevant to the assigned project, name of holders of those licenses and certificates, and names of the agencies issuing the licenses and certificates.
- 48VDC Power Systems shall be available at all sites.
- Contractor to provide DC Power Consumption Calculations for microwave radios, routers, and other DC Powered equipment (if any) provided by Contractor.
- Any upgrades to the existing power system or hardware for a new power system is not included in this engagement.
- AC power drop wiring within three (3) feet of DC power plants is excluded, unless specifically indicated in the Agreement.

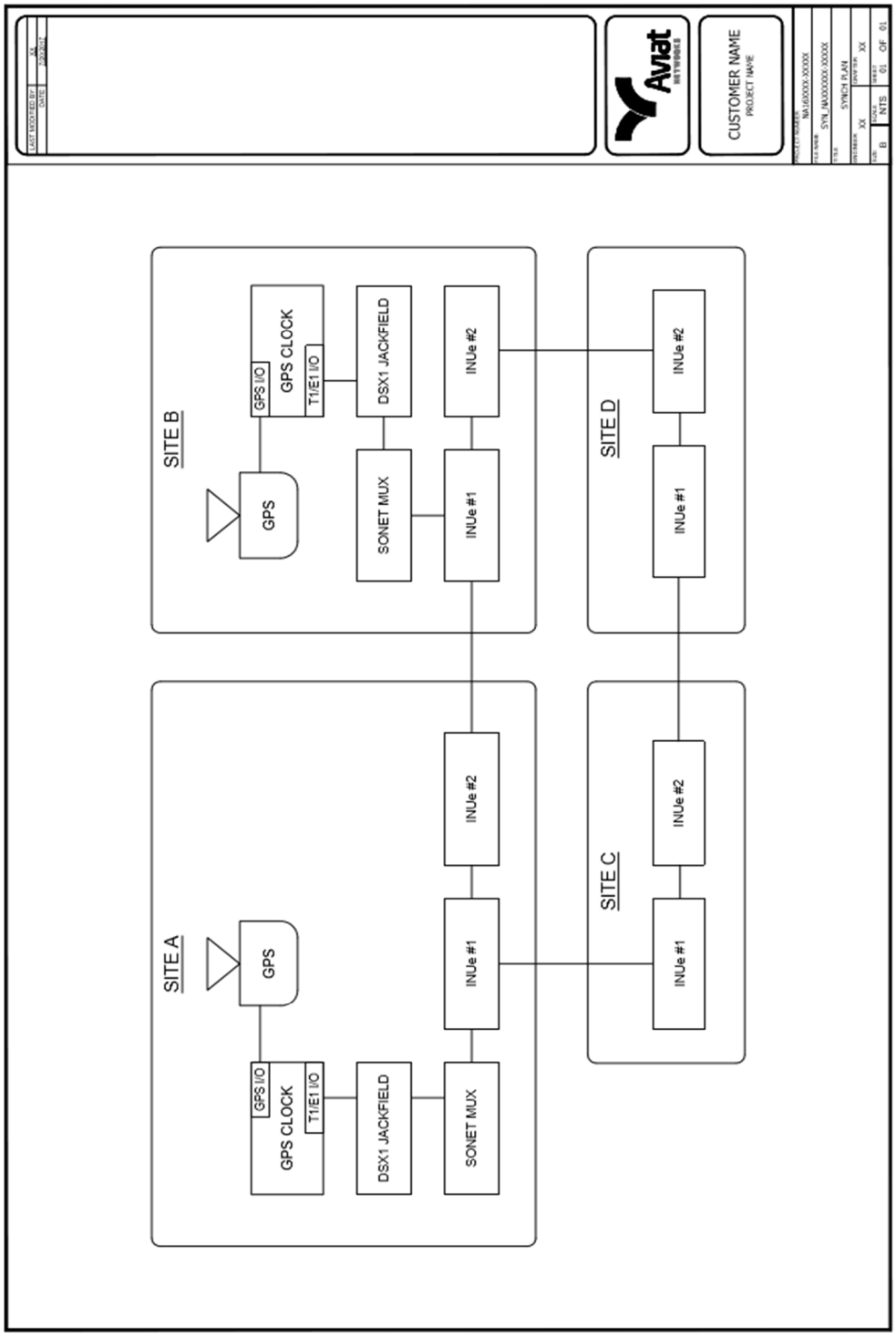
12. Appendix G: Field Change Order Procedure

Any change to the proposed system configuration, the number of sites, type of equipment, type of services or project responsibilities, or any other change to this Agreement shall be considered as a change in scope and will be subject to the following process:

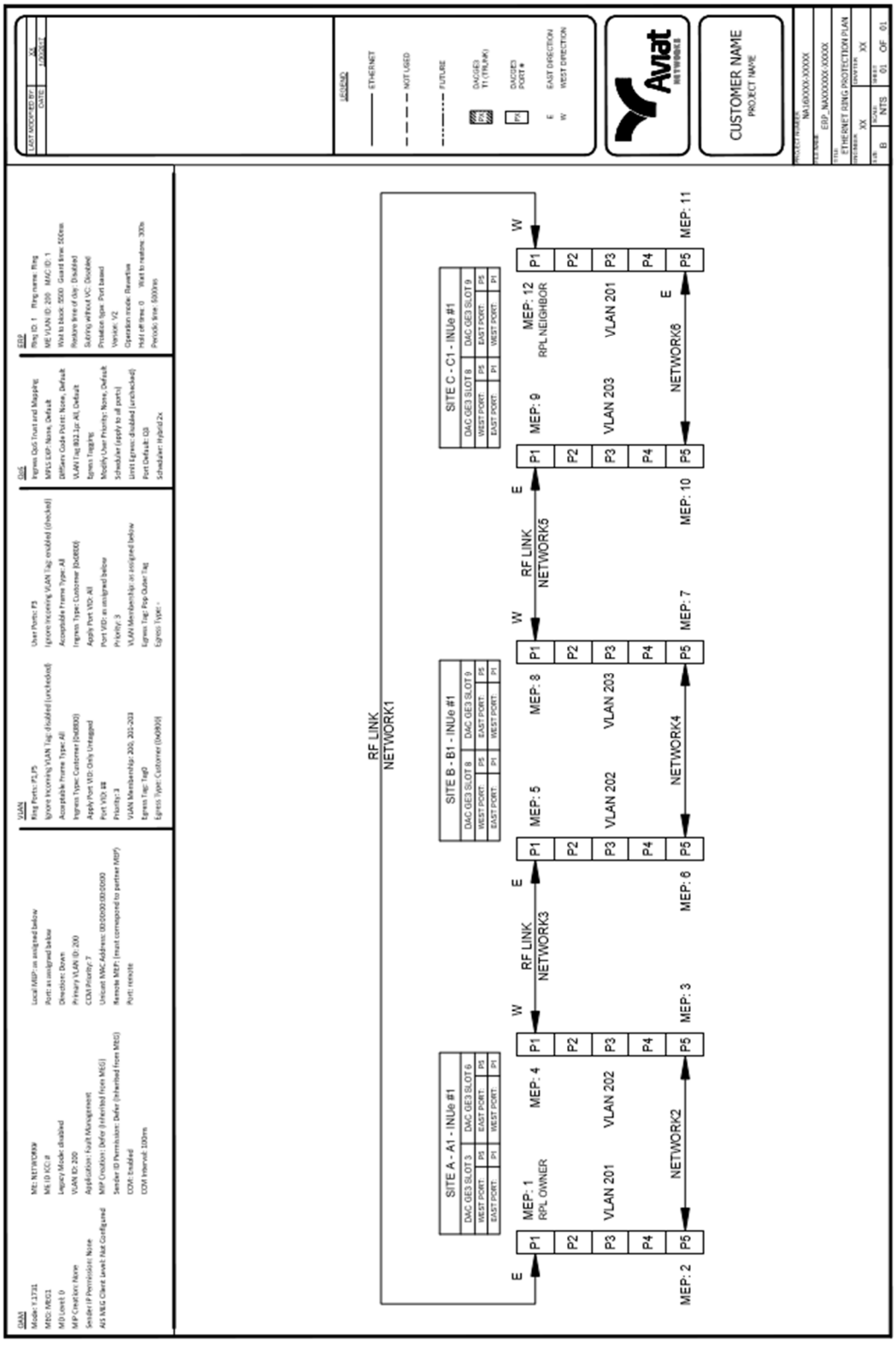
- The County or Contractor identifies a change of project scope of work.
- Contractor Project Manager or Network Engineer shall submit a proposed field change order authorization or an amendment to this Agreement containing documentation of the proposed additional activity and an additional cost.
- An authorized County representative shall review and approve the field change order authorization. A fully executed amendment to this Agreement is required prior to changes to the scope of work being implemented.

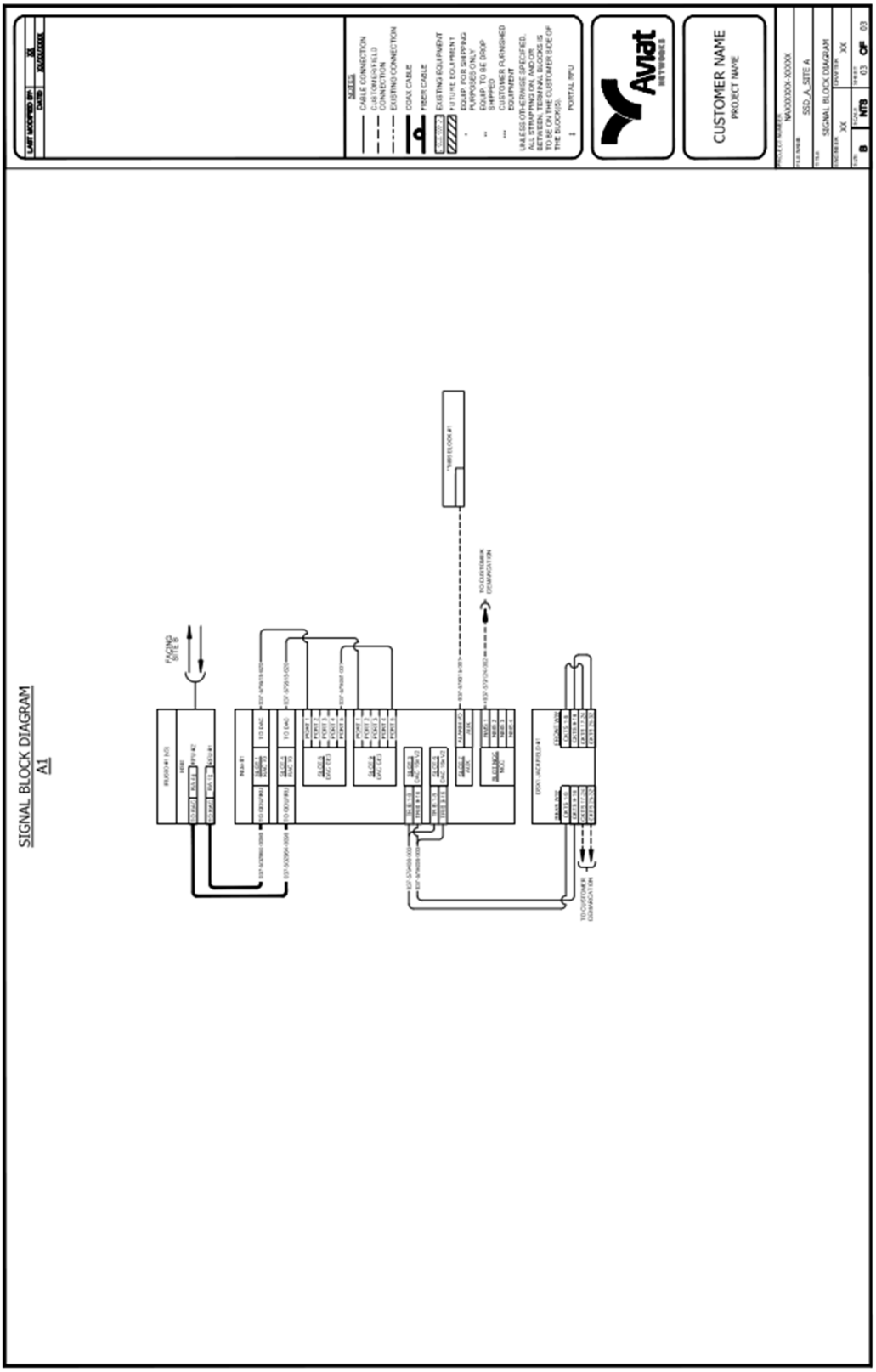
13. Contractor's Standard Drawings

Synch Plan

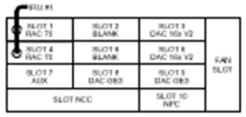


Ethernet Ring Protection Plan (ERP)

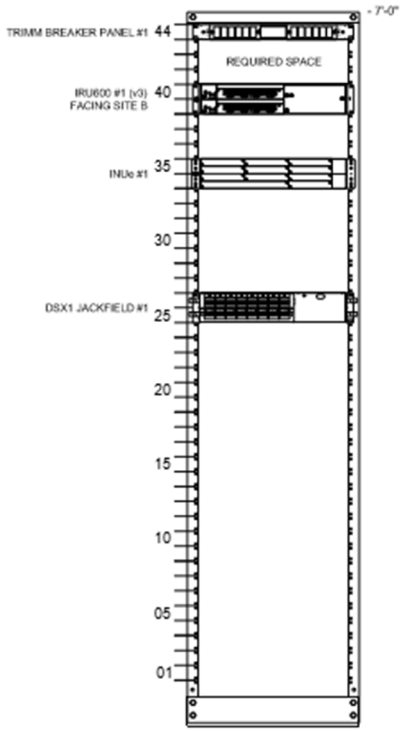



SIGNAL BLOCK DIAGRAM
A1
CUSTOMER NAME
PROJECT NAME
SSD_A_SITE A
SIGNAL BLOCK DIAGRAM
NOTES
CABLE CONNECTION
CUSTOMER FIELD CONNECTION
EXISTING CONNECTION
COAX CABLE
FIBER CABLE
EXISTING EQUIPMENT
FUTURE EQUIPMENT
EQUIP. FOR SHIPPING
EQUIP. TO BE DROP SHIPPED
CUSTOMER FURNISHED EQUIPMENT
UNLESS OTHERWISE SPECIFIED, ALL STRAPPING DX AND CPE BETWEEN TERMINAL BLOCKS IS TO BE ON THE CUSTOMER SIDE OF THE BLOCK(S).
PORTAL RPU
TO CUSTOMER DEMARCATION
TO CUSTOMER DEMARCATION

RACK PROFILE



INUe #1 CARD SLOTTING



RACKFACE ELEVATION - RACK A1
CHATSWORTH 7'-0" x 19" ALUMINUM RACK

LAST MODIFIED BY:	XX
DATED:	XX/XX/XXXX

NOTES:

- CABLE CONNECTION
- CUSTOMER FIELD CONNECTION
- EXISTING CONNECTION
- COAX CABLE
- FIBER CABLE
- EXISTING EQUIPMENT
- FUTURE EQUIPMENT
- * EQUIP. FOR SHIPPING PURPOSES ONLY
- ** EQUIP. TO BE DROP SHIPPED
- *** CUSTOMER FURNISHED EQUIPMENT

UNLESS OTHERWISE SPECIFIED, ALL STRAPPING ON, AND OR BETWEEN, TERMINAL BLOCKS IS TO BE ON THE CUSTOMER SIDE OF THE BLOCK(S).

1 PORTAL RPU

Aviat NETWORKS

CUSTOMER NAME
PROJECT NAME

PROJECT NUMBER:	NAXXXXXX-XXXXX
FILE NAME:	SSD_A_SITE A
TITLE:	RACK PROFILE
DRAWN BY:	XX
CHK'D BY:	XX
SIZE: B	SCALE: NTS
SHEET: 01 OF 03	

Sample Power Calculations

Sample Power Calculations

Eclipse Packet Node Power Consumption Calculation
Proposal #: NA130208-50689
Date: November 20, 2014
Network Engineer: M. Del Fierro

Site Name: Princeton

		Manual Entry
RFU / Module Type	**Consumption**	**Qty**
IRU600 1+1 High Power	124 W	1
RAC 60E	12 W	2
DAC GE V3	13 W	1
DAC 16X	2.5 W	2
NPC	8 W	1
INU or INUe	13 W	1
TOTAL		**187.00 W**

Total AMPS @ 48Vdc: **3.90 A**

Additional Equipment Load

Description	**Consumption**	**Qty**
TOTAL		**0.00 W**

Additional AMPS @ 48Vdc: **0.00 A**

Station Load (Amps)	**3.90 A**
Recharge Time (Hours)	24
Battery Reserve (Hours)	8
Ampere-Hour Multiplier	8.0
Termperature Correction Factor	1

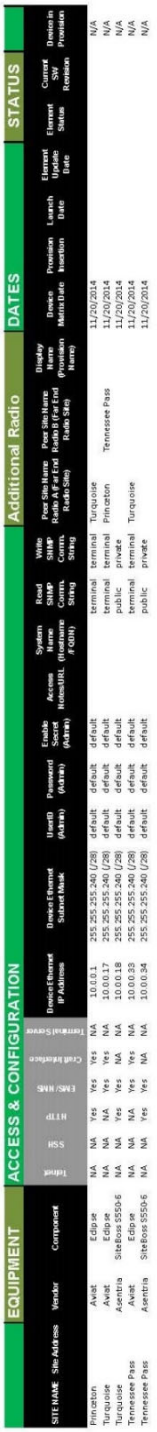
Min. Battery Plant Size (AMP-HRS) **31**
Min. Charger System Size (AMP Rating) **5**

WATTS to BTU/HR **794**
(incl. charger and equipment)

NOTE: Dehydrators operate with AC power

Hours Reserve===>	**2**	**4**	**6**	**8**	**12**	**24**	
Amp-Hour multiplier===>	**2.8**	**4.7**	**6.4**	**8.0**	**10.9**	**19.3**	
Temperature F(Deg)===>	**0**	**10**	**20**	**40**	**60**	**70**	**77**
Correction Factor===>	**2.0**	**1.85**	**1.59**	**1.3**	**1.11**	**1.04**	**1.0**

Battery Size (Min) = Station Load X Amp-Hour Multiplier X Correction Factor
Charger Size (Min) = (1.15 X Battery Size / Recharge Time) + Station Load



Sample IP Plan

EQUIPMENT				ACCESS & CONFIGURATION												Additional Radio			DATES				STATUS		
SITE NAME	Site Address	Vendor	Component	Telnet	SSH	HTTP	EMS / NMS	Craft Interface	Terminal Server	Device Ethernet IP Address	Device Ethernet Subnet Mask	UserID (Admin)	Password (Admin)	Enable Secret (Admin)	Access Notes/URL	System Name (Hostname FQDN)	Read Shared Comm. String	Write Shared Comm. String	Peer Site Name Radio A (Far End Radio Site)	Peer Site Name Radio B (Far End Radio Site)	Display Name (Provision Name)	Device Matrix Date	Provision Insertion	Launch Date	Element Update Date	Element Status	Current SW Revision	Device in Provision
Princeton		Avaya	Edge	NA	NA	Yes	Yes	Yes	NA	10.0.0.1	255.255.255.240 (/28)	default	default	default			terminal	terminal	Turquoise			11/20/2014						N/A
Turquoise		Avaya	Edge	NA	NA	NA	Yes	Yes	NA	10.0.0.17	255.255.255.240 (/28)	default	default	default			terminal	terminal	Princeton	Tennessee Pass		11/20/2014						N/A
Turquoise		Asentria	SiteBoss 5550v6	NA	NA	NA	Yes	NA	NA	10.0.0.18	255.255.255.240 (/28)	default	default	default			public	private				11/20/2014						N/A
Tennessee Pass		Avaya	Edge	NA	NA	NA	Yes	Yes	NA	10.0.0.33	255.255.255.240 (/28)	default	default	default			terminal	terminal	Turquoise			11/20/2014						N/A
Tennessee Pass		Asentria	SiteBoss 5550v6	NA	NA	Yes	Yes	NA	NA	10.0.0.34	255.255.255.240 (/28)	default	default	default			public	private				11/20/2014						N/A

Any additional services and change orders, requested, and approved by the County, not included in this Agreement, shall be quoted on as needed basis. Any additional services and change orders will be submitted by the Contractor and must be pre-approved by the Chief Information Officer (CIO), or CIO's designee in writing, prior to commencing work. A fully executed amendment to this Agreement is required prior to any additional services and change orders.

The methods and techniques used to provide the services indicated herein to the County are within the Contractor's discretion, but subject to the County Information Services Department's technology policies, guidelines, and requirements. The amount of time, specific hours, and location of the performance of Contractor's services are left to the Contractor's discretion provided that the Contractor coordinates with County Information Services Department as needed.

Exhibit B

PAYMENTS, RATES, AND INVOICING

In consideration of the services provided by Contractor described in Exhibit A and subject to the terms of the Agreement, County shall pay Contractor based on the following fee schedule and terms:

Milestone: Path and Site Surveys	Amount
Upon 100% Completion and Approval of Reports	$638,839.30

Milestone: Design Freeze	Amount
Upon 100% Completion and Approval of Design Freeze	$638,839.30

Milestone: Shipment of all Equipment, Confirmation of Receipt of all Equipment, and Successful Factory Testing of all Equipment	Amount
Upon 100% Completion of Shipment of all Equipment, Confirmation of Receipt of all Equipment, and Successful Factory Testing of all Equipment	$3,194,196.50

Milestone: Product Training	Amount
Upon 100% Completion of Installation of Product Training	$63,039.00

Milestone: Installation of Radios on the Ring	Amount
Upon 100% Completion of Installation of all Radios on the Ring	$798,549.13

Milestone: Installation of Spur Radio Links	Amount
Upon 100% Completion of Installation of all Spur Radio Links	$798,549.13

Milestone: System Acceptance	Amount
Upon 100% Completion and System Acceptance	$319,419.64

Summary of Milestones	Amount
• Path and Site Surveys • Design Freeze • Shipment of all Equipment, Confirmation of Receipt of all Equipment, and Successful Factory Testing of all Equipment • Product Training • Installation of all Radios on the Ring • Installation of all Spur Radio Links • System Acceptance	
GRAND TOTAL	**$6,451,432.00**

Total Not to Exceed Amount for this Agreement is $6,451,432.

INVOICING

Contractor shall request approval/confirmation via email to the County's designated Project Manager (PM) by submitting a Milestone Completion Certificate indicating completed services/milestones indicated in this Agreement. Once approval/confirmation has been secured, Contractor shall send an invoice together with the Approved Milestone Completion Certificate .

Each invoice submitted must include the following information, at a minimum:

- Invoice Number and Date
- Agreement Number and/or Purchase Order Number
- Detailed statement of actual services
- Breakdown of labor, materials and taxes (when applicable)
- Total amount of invoice

Invoices must be sent to ISD-Vendor-Invoices@smcgov.org. Processing time may be delayed if invoices are not submitted electronically and without written approval/confirmation (Approved Milestone Completion Certificate) from designated County PM.

The County shall submit payment within net thirty (30) days of receipt of invoice, for services rendered conditioned upon the approval of services performed during the billing cycle.

System Summary

County of San Mateo

Microwave System Design and Update

RFP# ISD-20221849

Release 1.2
7-22-2022

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1. Introduction

Aviat Networks (Aviat) is pleased to present its hybrid (TDM+IP-MPLS) microwave system design for the County of San Mateo. We have carefully reviewed the specification and information provided to us and believe we have a thorough understanding of the microwave system requirements.

The proposed system consists of 38 hops of Eclipse IRU 600v4 and ODU 600v2 radios with 300 Mbps of RF capacity around the Ring and 50 Mbps of RF capacity on the spurs.

For ease of maintenance, as mentioned in the RFP, **all the radios are proposed as indoor rack-mount** except for sites Burlingame, Millbrae FD, and San Bruno PD.

Below is a short summary of all the RF hops:

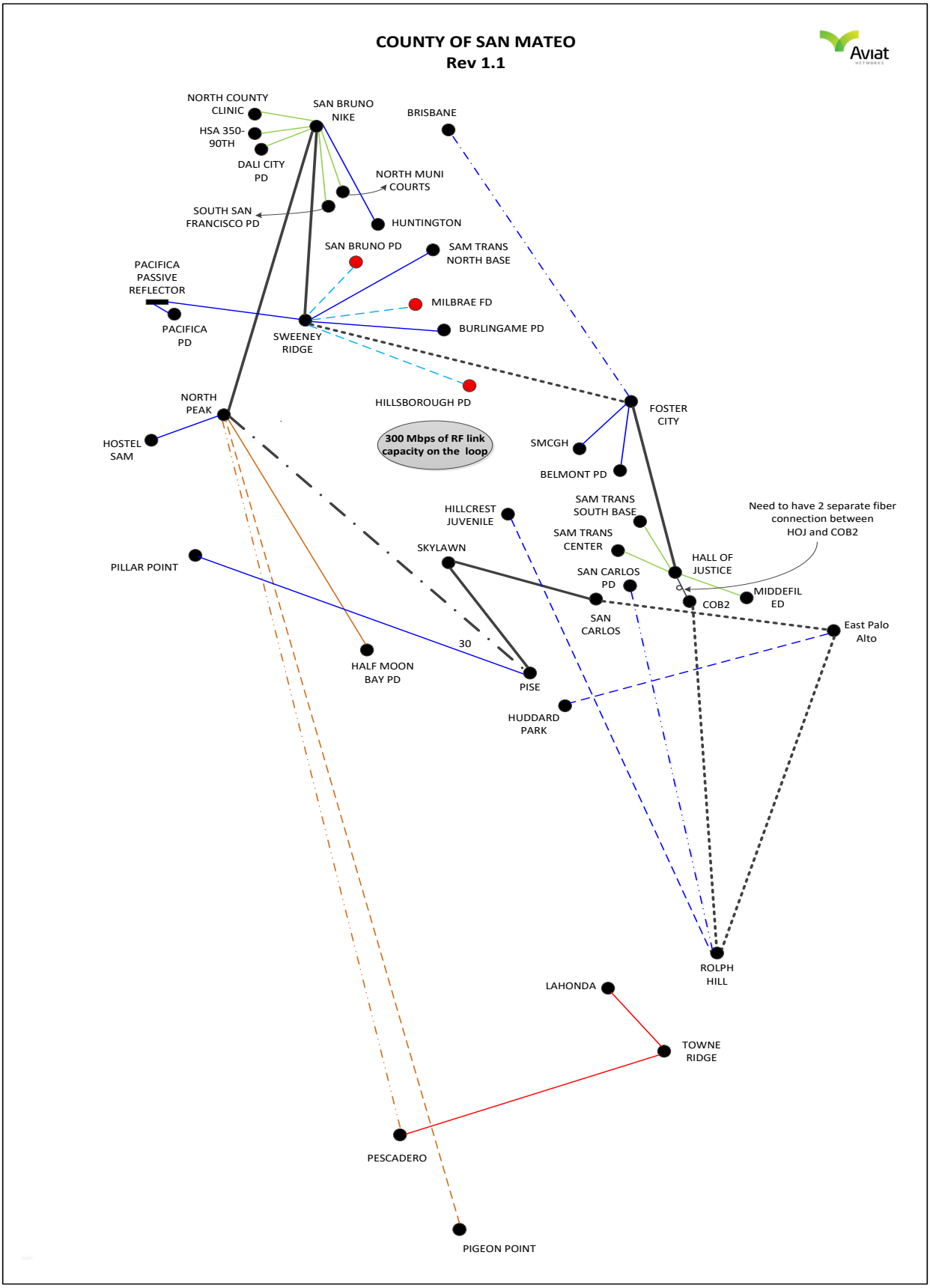
- IRU 600 v4 6/11 GHz indoor radios: 25 hops
- ODU 600 v2 18 GHz radios: 8 hops. Aviat design includes the necessary hardware to mount these radios indoors in a rack
- IRU 600v4-11 GHz and ODU 600 v2 11 GHz: 3 hops, as mentioned in the RFP, Aviat proposed indoor radios on one end (Sweeney Ridge) and Outdoor mount radios on the far end site (Burlingame, Millbrae FD, and San Bruno PD).

The proposed design includes Non-Protected radios on the loop except for Pise to North Peak and monitor hot standby radio configuration on all the spur links. Aviat has proposed Space- Diversity configuration between Pise to North Peak and Foster City Brisbane, as mentioned in the RFP, to avoid any possible reflection.

The microwave indoor units are equipped with protected both Ethernet and DS1 interfaces.
For Ethernet loop protection, Aviat has proposed stacked (two) CTR 8740 routers on each of the loop sites.

For TDM loop protection Aviat has proposed protected NCM card on each site of the loop.

All the spurs are designed as layer 3 with protected Ethernet cards and stacked 8740 routers.


COUNTY OF SAN MATEO
Rev 1.1
Aviat
NETWORKS
NORTH COUNTY CLINIC
SAN BRUNO NIKE
BRISBANE
HSA 350-90TH
DALI CITY PD
NORTH MUNI COURTS
SOUTH SAN FRANCISCO PD
HUNTINGTON
SAN BRUNO PD
SAM TRANS NORTH BASE
PACIFICA PASSIVE REFLECTOR
MILBRAE FD
PACIFICA PD
SWEENEY RIDGE
BURLINGAME PD
HILLSBOROUGH PD
NORTH PEAK
FOSTER CITY
HOSTEL SAM
300 Mbps of RF link capacity on the loop
SMCGH
BELMONT PD
HILLCREST JUVENILE
SAM TRANS SOUTH BASE
Need to have 2 separate fiber connection between HOJ and COB2
SAM TRANS CENTER
SKYLAWN
HALL OF JUSTICE
PILLAR POINT
SAN CARLOS PD
MIDDEFIL ED
COB2
SAN CARLOS
East Palo Alto
30
HALF MOON BAY PD
PISE
HUDDARD PARK
ROLPH HILL
LAHONDA
TOWNE RIDGE
PESCADERO
PIGEON POINT

2. Preliminary Path-Analysis

Preliminary Path Loss and Fade Margin Calculations have been provided as part of the documentation for this proposal. The Vigants 1975 reliability models have been used. The paths are designed to provide a reliability meeting or exceeding an annual **availability** objective **at 99.999%** using **guaranteed** radio specifications defined at **10-6BER.** These path calculations are done based on site coordinates, ground elevations, and antenna height obtained from multiple sources and assume that sufficient clearance is available on all paths. This data should be field verified prior to the start of the frequency coordination.

Out of 10 links on the loop, six (6) links are designed using 40 MHz channels, and four (4) links are designed using 80 MHz channels. Using **40 and 80 MHz channels along with Extra High-Power** radios allows us to meet the required RF capacity **of 300 Mbps and reliability of 99.999%.** Aviat has proposed using 3 or 4 ft dishes on the loop in order to keep the tower loading to a minimum, especially for below hops, as these sites might be congested.

- SWEENEY RIDGE - FOSTER CITY
- SAN CARLOS - EAST PALO ALTO
- ROLPH HILL - EAST PALO ALTO
- ROLPH HILL - COB2

All the spurs are designed using 10 MHz channels.

Please note Aviat's proposed design is based on availability of frequencies and channel size. Aviat would perform frequency coordination after the bid is awarded and confirm the availability of frequencies. If the frequencies and channels are not available, path calculation and design may need to be updated, which may lead to a change order if any additional hardware is needed.

2.1 Path Reliability and Capacity

To get more capacity around the loop while having good reliability, i.e., 300 Mbps of RF capacity at >99.999 reliability, Aviat has proposed its **Extra High-Power radios.** It allows us to **use 3 or 4 ft** antennas on these links to meet the capacity and reliability number. Since the design is based on using the **same or smaller size dish compared to the County's existing antenna, no additional load is added to the tower once the old dish is replaced with a new one**. The Aviat EHP radio is a key differentiator in the NA market, and no other radio achieves the same Guaranteed Power Output.

Aviat has proposed EHP radios for the hops which are obstructed by trees to provide maximum Tx and achieve the reliability of ~ 99.999.

All the path calculations are done using **NON-ACM profiles**. Based on Aviat's extensive experience with mission-critical systems, ACM (adaptive coding modulation) is not recommended for use on ring systems, fading on any single path results in a bandwidth capacity reduction. On a ring (similar to LADWP's system) with all paths using ACM, the ring capacity could become unstable and unpredictable, increasing the potential for outages while effectively reducing the whole ring capacity to the lowest capacity setting of ACM. Consequently, Aviat designed this system using "**fixed modulation**", even though the proposed radio solution supports ACM feature via software license, i.e., QPSK to 4096QAM. ACM licenses which are field upgradeable, are quoted as an option.

Please refer to path calculation for more details.

3. Microwave RF Unit, Indoor Unit, and Configuration

3.1 IRU 600 V4 Radio: Indoor Radio

The IRU 600 v4 RF indoor unit with Extra high power, high or standard power options are proposed on most of the links.

IRU 600 are truly hybrid radios with native TDM and native IP support. Hybrid mixed-mode operation transports native Ethernet side-by-side with TDM. It means Ethernet can be overlaid on a TDM network to meet rapidly growing data demands, with existing network synchronization maintained via the TDM connections. Adding Ethernet to an Eclipse radio link simply requires the installation of a GigE card. At this point, an operator can locally or remotely configure the capacity split between Ethernet and PDH - Ethernet can be activated when and where as needed in the network with minimal disruption.

- The radio link capacity assigned between Ethernet and TDM can be optimized at any time.
- Changing from mixed-mode Ethernet+TDM to all-Ethernet only requires a configuration change. All link capacity is simply directed to Ethernet, and the TDM interface card(s) removed, leaving native Ethernet radio with capacity, flexibility, and IP intelligence the match of any IP-only radio. There is no loss of transport efficiency when a mixed-mode link is ultimately migrated to all IP/Ethernet.

For any latency-sensitive application, native T1 is the recommended option as compared to emulated T1 (T1 pseudo-wire) since emulated T1 circuits introduce higher latency and consume more Bandwidth (typically from 1.8 Mbps to 2.2 Mbps) as compared to native T1 circuits.

The IRU 600 Non-Protected comprises single RFUs (radio frequency units), while MHSB and Space Diversity Split Transmitter configuration comprise two RFUs (radio frequency units).

Using **Extra High-power radios**, Aviat has designed the loop hops for 300 Mbps of RF link capacity using the same or smaller antenna size as compared to the existing county antenna. If the customer wants more Bandwidth around the loop, they only need to purchase additional capacity license and obtain larger channels. There is no need to change the antenna size. This Extra High power radios option is used in our design to significantly reduce antenna sizes. It will lead to significant cost savings for the County by reducing the need for tower reinforcements or getting more Bandwidth.

IRU600 - HIGHEST POWER INDOOR RADIO ON MARKET

- Rack mounted RF unit co-locates with an INU or INUe or MPLS router
- Various Frequency bands offered
  - 5.8 (UL), L6, U6, 7, 8, 10, 11 GHz frequency bands
- Channel sizes from 3.75Mhz to 80Mhz Wide
- High power up to 39 dBm
- From QPSK up to 4096 QAM
- Tx coaxial switch for hot standby and space diversity
- High system gain w/ support for paired and unpaired frequencies on filter based ACU
- Two different bands may be used in the same chassis e.g. 6 & 11 GHz in a 1+0 repeater
- Three Transmit Power configurations: Standard, HP, and EHP (FCC Only)
- Up to 715 Mbps per RFU



3.2 ODU 600 Radio, Outdoor, and Indoor Radios

Similar to IRU 600, ODU 600 are truly hybrid radios with native TDM and native IP support. Hybrid mixed-mode operation transports native Ethernet side-by-side with TDM. Aviat has proposed these radios for 18 GHz and outdoor applications.

The ODU radios can be implemented as indoor or outdoor mount for ultimate flexibility.

AVIAT ODU600v2

- **Future-proof outdoor units for split-mount configurations**
  - Capacity support up to 1 Gbit/s in a single channel
- **Frequency coverage from 6 to 42 GHz**
- **Modulation support up to 4096QAM**
- **Channel sizes up to 80MHz**
- **Fewer variants due to wider tuning range**
- **Modulation/channel size support:**
  - Up to 256QAM/56MHz with RAC60/6X (Eclipse)
  - Up to 1024QAM/56MHz with CTR 8540 (RACx2), 83xx
  - Up to 4096QAM/112MHz with RAC70/7X (Eclipse) or RACx2W* (CTR 8540)
- **Identical RF performance to ODU600v1 when mated with Eclipse or CTR**
- **OTA interoperability between ODU600v1 and ODU600v2**
  - 1+0, 1+1 and 2+0 configurations
  - Same ODUs version required at each end (can't mix different ODUs at one end for 1+1/2+0)

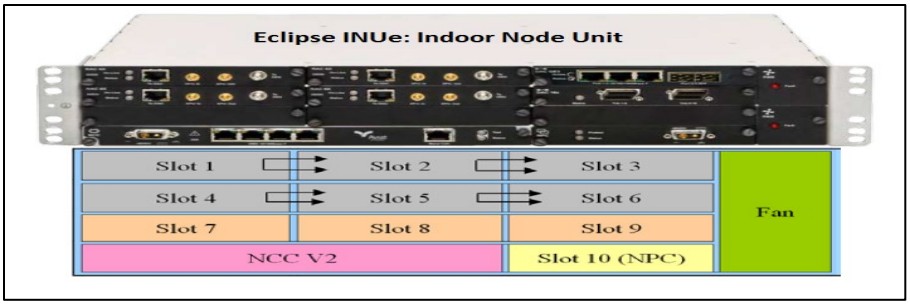


All the ODU are indoor mounts except for Burlingame, Millbrae FD, and San Bruno PD, where they are mounted outdoor at the back of the antenna.

3.3 ECLIPSE NODE: INUe

Aviat has proposed Eclipse INUe Indoor Node unit for all sites. On loops sites, Aviat is proposing a dual shelf redundant design for the indoor microwave unit. Each ring node will have a minimum of two INUe for east and west path redundancy, while each spur will have a single INUe with protected power and data access cards for no single point of failure.

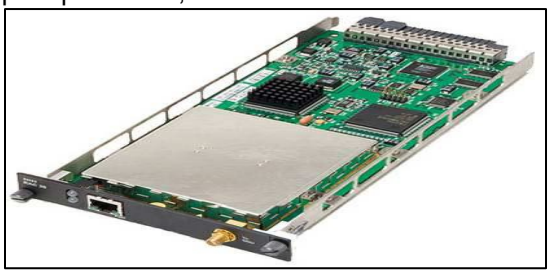
The Eclipse node replaces the traditional terminal or single-link based approach to networking with a nodal solution. The INUe has ten optional slots. It supports up to six non-protected links and three protected links on frequency bands from 5 to 38 GHz. Radio paths and customer interfaces are customized by plug-in cards, with the interconnection of traffic and services supported by a backplane bus. Plug-in cards enable quick and easy service customization. All cards are hot-swappable.



3.4 Plug-in Cards Proposed for the Indoor Unit as Part of this Design:

3.4.1 RAC 70 Card: Support the Radio Modem Function

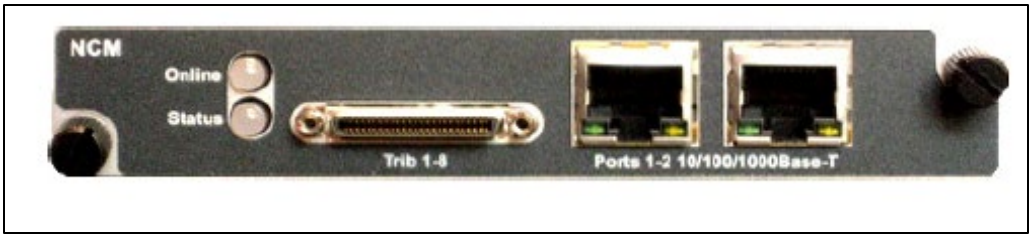
Each NP link will have a single modem card since these links are on the loop and have path protection, while each MHSB link will have two RAC 70 cards.



- Front panel Data Packet Plane to connect to a DAC GE
- Adaptive coding and modulation (ACM) - QPSK to 4096 QAM
- Coding options for maximum throughput or max system gain
- Superior ACM system gains
- Channel BW 3.75-80 MHz ANSI.

3.4.2 The NCM (Network Convergence Module) Provides DS1 Loop-Switch Capability

For DS1 loop protection, each site on the loop is equipped with **protected NCM** card in **1+1 configuration.**



It is assumed that there is fiber pair between COB2 and HOJ for Aviat to complete TDM loop and perform loop protection using NCM.

This fiber is used for TDM loop protection and is separate from the dark fiber need to Ethernet loop.

3.4.3 DATA ACCESS CARDS TDM DAC 16 – Supports T1

Each site on the loop is designed with **protected DAC 16** cards in **1+1 configuration,** which can drop up to 16 T1 per site.

COB2 and HOJ have multiple DAC 16 cards to drop 56 and 28 T1s, respectively. All the spurs' sites are designed with protected DAC 16 cards to drop maximum of 16 T1.

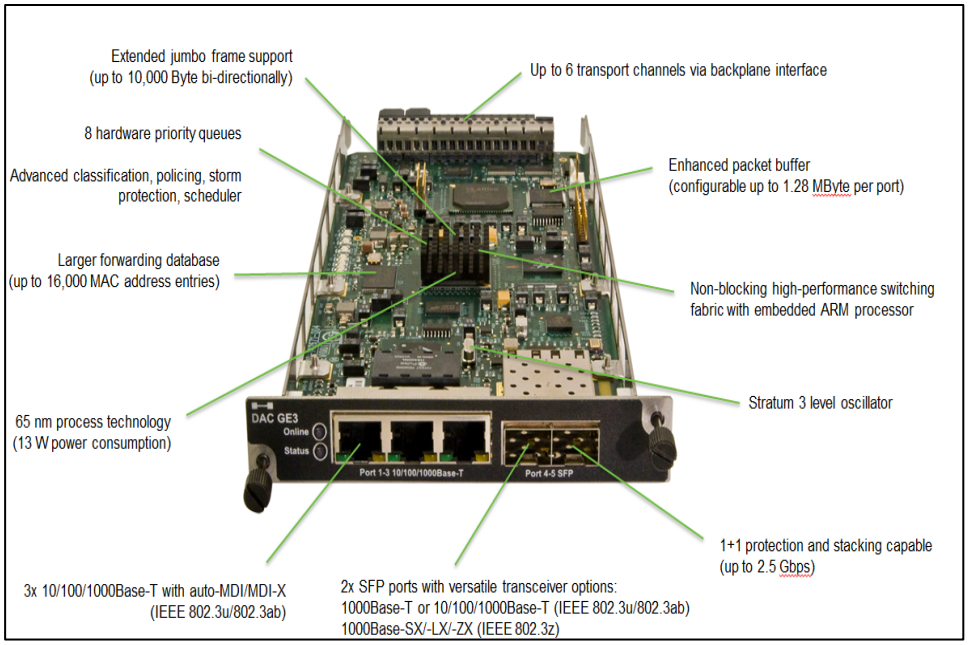


- 16xDS1 tributaries on compact HDR connectors
- Tributary protection
- Ethernet over unframed E1/DS1 tribs. An Ethernet-over-TDM feature license required
- 75 ohm unbalanced or 120 ohms balanced on E1 tribs
- Individual line code selection for AMI or B8ZS on balanced 100-ohm DS1 tribs

3.4.4 DATA ACCESS CARDS DAC GE 3 – Supports Ethernet

Each site on the loop is designed with minimum of one DAC GE card per INUe facing east/west direction. Each INUe would have minimum of one DAC GE card, which would connect to Aviat MPLS router for loop protection. All the spurs sites are designed with protected DAC GE cards.

For Ethernet traffic, all radios will be equipped with (2) DAC GE3 cards east-west configuration (one card facing each direction) on the Ring. Each card has both Electrical 10/100/1000 interfaces and SFP cages that provide Electrical Ethernet SFP.



- Three (3) RJ-45 10/100/1000Base-T ports, Two (2) multi-purpose SFP ports with plug-ins for Optical LC, 1000Base-LX, 1310 nm single-mode, and Optical LC, 1000Base-SX, 850 nm multi-mode
- On the spurs, Aviat will be using one electrical port on each DAC GE connecting to the RFU on one SFP port for stacking both the DAC GEs together
- Comprehensive QoS traffic prioritization and scheduling options:
  - 802.1p mapping
  - DiffServ mapping (IPv4, IPv6)
  - MPLS Exp bits mapping
  - Strict priority scheduling
  - Deficit Weighted-Round-Robin (DWRR) scheduling
  - Hybrid strict + DWRR scheduling
  - Eight transmission queues

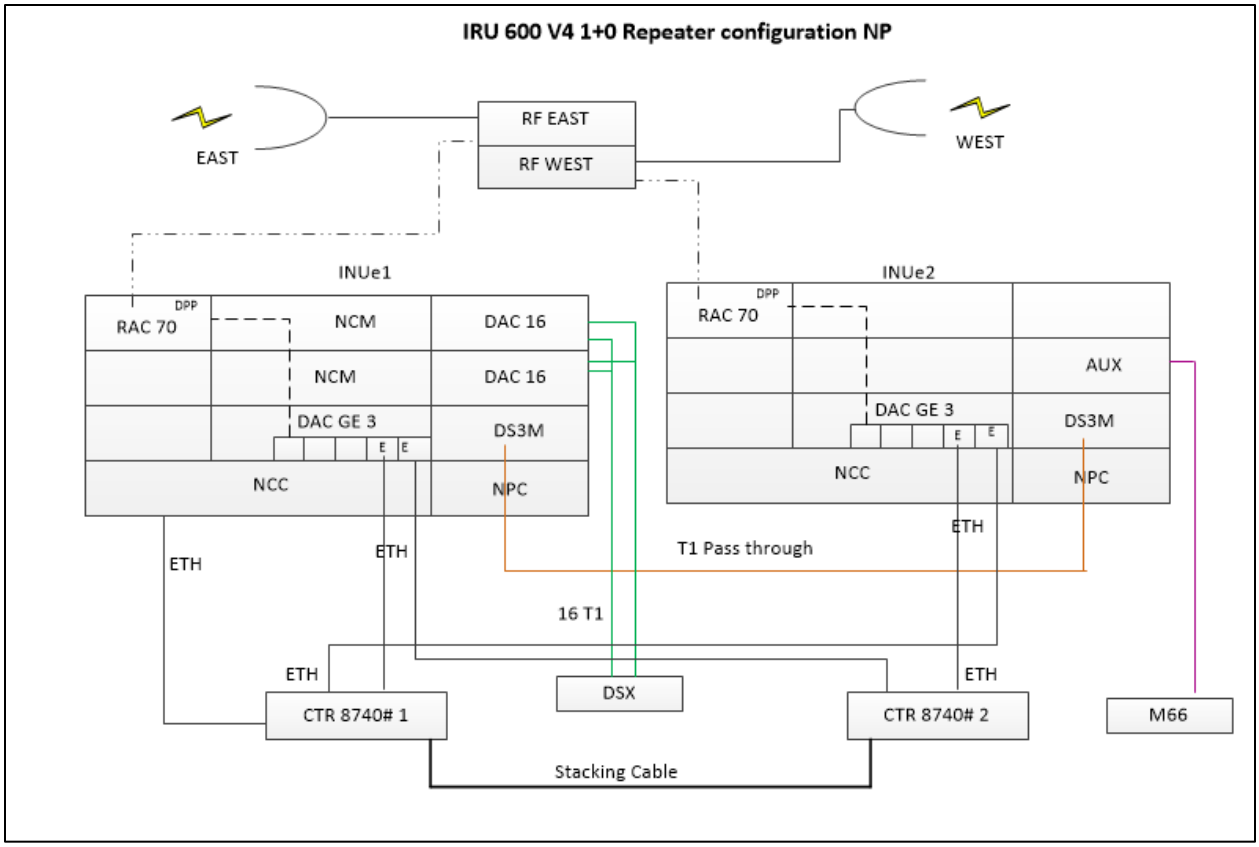
3.4.5 AUX Card

Each site is designed with (1) AUX card, which can monitor up to 6 environmental dry contact alarms, which can be input or output. If more alarm ports are needed, additional Aux needs to be purchased.

These alarms are reported as major or minor alarms to the Aviat proposed ProVision system.

3.4.6 OC3- MUX card

As shown below, each INUe on the loop is provided with a **NON-protected OC3** Mux card to pass the T1 from one chassis to another.

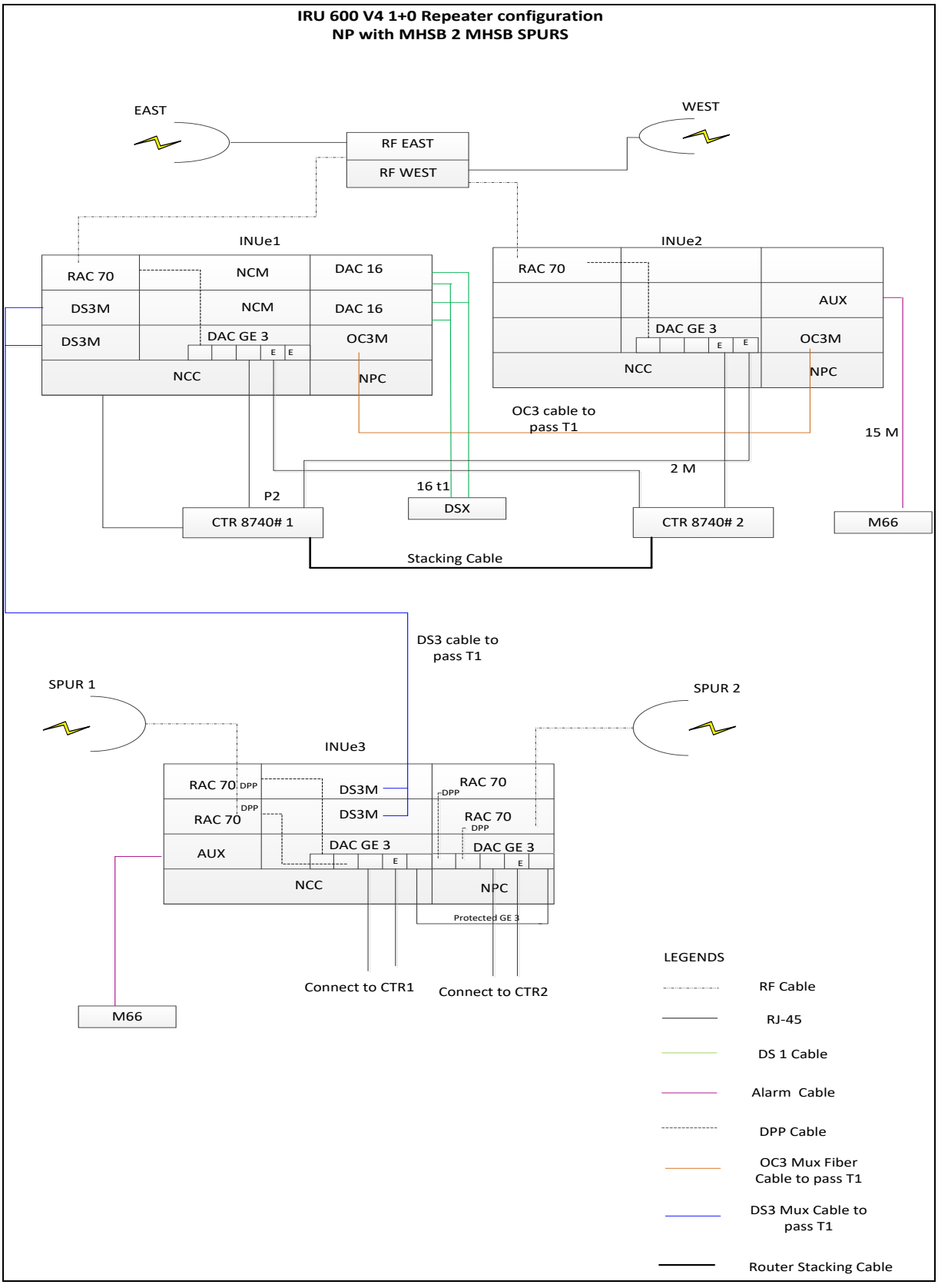


Typical SBD for a loop site facing EAST and WEST

3.4.7 DS3- MUX card

For sites where we have multiple spurs, Aviat has proposed multiple INUe. To pass the T1s between these INUe going to spur, we are using **protected DS3 - Mux** card as shown below.

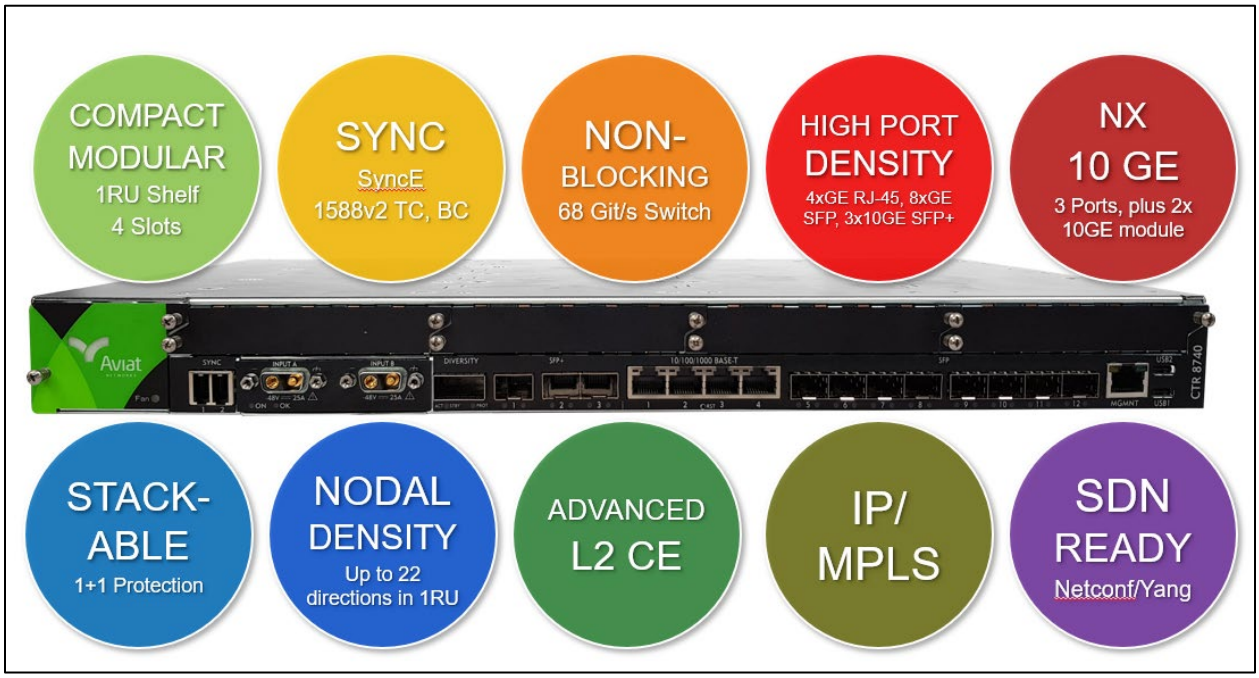
Aviat has proposed this design to avoid extra wiring and DSX for T1's going from loop sites to spurs. Using DS3M cards, T1 can be directly passed through between the INUes without dropping them.


IRU 600 V4 1+0 Repeater configuration
NP with MHSB 2 MHSB SPURS
EAST
WEST
RF EAST
RF WEST
INUe1
RAC 70
NCM
DAC 16
DS3M
NCM
DAC 16
DS3M
DAC GE 3
OC3M
NCC
NPC
INUe2
RAC 70
AUX
DAC GE 3
OC3M
NCC
NPC
OC3 cable to pass T1
15 M
2 M
16 t1
P2
DSX
CTR 8740# 1
CTR 8740# 2
M66
Stacking Cable
DS3 cable to pass T1
SPUR 1
SPUR 2
INUe3
RAC 70
DPP
DS3M
RAC 70
AUX
DAC GE 3
NCC
NPC
Protected GE 3
Connect to CTR1
Connect to CTR2
M66
LEGENDS
RF Cable
RJ-45
DS 1 Cable
Alarm Cable
DPP Cable
OC3 Mux Fiber Cable to pass T1
DS3 Mux Cable to pass T1
Router Stacking Cable

Typical SBD for a loop site facing EAST and WEST with multiple spurs

4. AVIAT MPLS Network

The Aviat solution is based on the CTR8740 platform as a Provider Edge (PE) router that supports microwave, Carrier Ethernet and IP/MPLS functionalities all in the same device.



CTR 8740 CHASSIS:
1 RU height chassis includes:
- o -48 V DC power supply – Dual Input
- o Local Management & Console Ports (RJ-45 and USB-C)

USER INTERFACES:
- Four 1000BASE-T (RJ-45)
- Eight 1000Base-X (SFP) unpopulated ports:
  - Single-mode -LX (1310nm), -ZX (1550nm) optical
  - Multimode -SX (850nm) optical
  - 1000Base-T (RJ-45)
  - STM-1 & STM-4 (1310nm) Optical TSOP
- Three 1000/2500/10GBase-X (SFP+ unpopulated)

Aviat proposed dual shelf redundant design for each ring site. In this configuration, both routers are stacked together to work as one with redundant hardware, control, and data plane. On the spur sites, Aviat has proposed Stacked MPLS routers and has designed the spurs using stacked ethernet card on the Eclipse INUe.

A dark fiber pair is needed between COB2 and HOJ for MPLS loop protection; This is separate from dark fiber needed for TDM loop application.

Multi-protocol Label Switching (MPLS) was designed to work in a multiple protocol environment supporting both legacy network technologies and the latest IP-based technologies. Our proposed design for the County of San Mateo microwave backhaul replacement enables MPLS on the loop, which will support transport of Ethernet -IP based services over a high capacity hybrid microwave backhaul system and will, in turn, prepare the network for the future transition to all IP based services.

Different backhaul transport technologies such as IP/MPLS, Static and Dynamic IP Routing; MPLS LDP and RSVP-TE; L2 VPN (VPLS, VPWS) & L3 VPN services, QoS will be used to design the MPLS ring. While the traffic going to the spur or coming from the spur sites to the loop site will be designed using Layer 2 technologies such as VLAN, service Ques, Scheduling, etc., over Aviat Eclipse DAC GE cards.

Aviat will provide a detailed IP/MPLS plan covering the following:

- Layer 1 connectivity: list or ports, types, speed/duplex
- Layer 2 parameters: VLANs, Service provider Ques
- Layer 3 parameters: IP addresses, mask, topology, IGP protocol, area design, routing, and BFD parameters
- MPLS signaling protocols, parameters, and protection schemes
- MPLS services: list of all VPNs and their configuration parameters (VRFs, route targets, PWs, etc.)
- QoS schemes: classification rules, priority mapping, scheduling, and shaping schemes
- Security plan: user accounts, authentication, and encryption schemes
- Management plan: ports, IP addresses, and routing

5. Network Management System

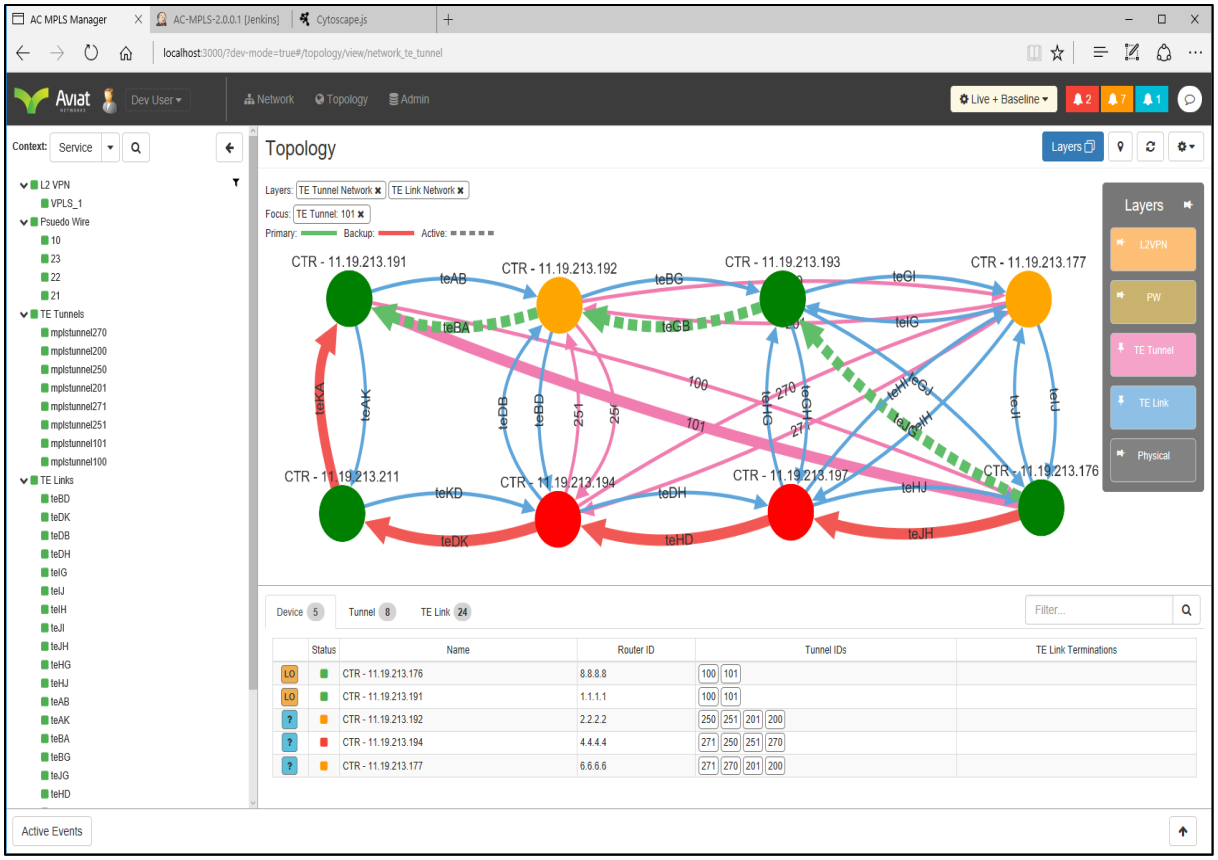
For System monitoring, Aviat has proposed **ProVision** and **ProVision Plus** software on redundant server configuration.

ProVision is a comprehensive Element Management solution for events, faults, performance, configuration, and inventory management. It is based on SNMP (Simple Network Management Protocol), the widely accepted standard for performing network management functions. This would be mostly used to monitor and configure Eclipse units.

ProVision Plus is the new next-generation integrated element and service manager. It supports multiple SBI, multiple domains, **and IP/MPLS services**. It is engineered to bring an unparallel degree of visibility and efficiency to the service management challenge. Communication with the managed network takes place either directly with network devices or via a ProVision mediate system, depending on the type of network elements. The new **CTR8740 routers will be managed** by ProVision Plus.

ProVision Plus provides the ability to configure end-to-end MPLS circuits and a visual diagram of all the circuits in the networks. Its **GUI** makes it easy to configure MPLS circuits and troubleshoot any MPLS circuits without having extensive knowledge of CLI commands.

Below is an example of how different kind of MPLS circuits is discovered on PV+.



Both Provision and Provision plus would be installed on the same server. All the proposed equipment can be monitored using Provision Plus as Provision is integrated into Provision Plus to manage Eclipse nodes.

Aviat's proposal also includes Frequency Assurance Software (FAS) as **OPTIONAL ITEM.** Aviat's FAS (Frequency Assurance Software) offers sophisticated, well-tested monitoring and analysis of unlicensed 6 GHz—and can trigger corrective action to protect link stability. This software is a direct response to the FCC rules opening the 6 GHz band to unlicensed users. It's a comprehensive solution designed to protect customers from pending radio local area network (RLAN) deployments in the 6 GHz band.

Below are the seven links which are part of FAS

1. La Honda to Town Ridge
2. Town Ridge to Pescadero
3. North Peak to Half Moon Bay
4. North Peak to Pigeon Point
5. North Peak to Pescadero

County will own the software for those five (5) links, and Aviat will provide software support/updates for FAS for ten (10) years.

6. Spares

All the recommended spares are quoted as part of Aviat proposal. A minimum quantity of two (2) spares of all active components for the radio, router, and indoor unit is included in the bid.
Quantity of 1 spare is included for OEM components such as GPS clock, RAD cards, and dehydrator.

7. Equipment Racks

Aviat has proposed new racks on all the locations.

The Proposed new racks are 7' x 19" aluminum racks equipped with seismic Zone 4 Kits.

8. Antennas and Waveguide System

Aviat's proposal includes new Antennas, Waveguide System, and Dehydrators on all the sites except for hop Pescadero – Towne Ridge- Lahonda. These hops were installed just 2-3 years before by Aviat. So Aviat proposes using the existing antenna system for this hop and upgrading the radios to MHSB radios.

8.1 Antennas:

Sentinel® High Performance Antenna Antennas are included in the main bid.

Sentinel® High Performance Antenna has a better frequency pattern, and it would be easier to get new frequencies in the future if County wants to add more hops or channels to the existing hops.

Since Aviat is replacing the existing antennas with smaller or same size dishes, we would be using existing antenna mounts. The pricing for new antenna mounts is quoted as an optional item.

9. RAD 4100- DACS

Aviat has proposed RAD 4100 DAC to **groom multiple DS0, E&M circuits, FXO/FXS, and Data circuits into a single DS1**. The proposed RAD is fully protected with dual controller, Power Supply. RAD 4100 has 10 I/O slots, which supports different cards for various applications. Aviat's proposal includes **protected** T1 RAD cards for 1+1 protection to groom up to 64 T1.

A spare controller, power, and T1 card are also provided. RADs will be monitored via SNMP using Aviat provision system. Training for RAD 4100 is also included in Aviat's proposal.

Please note the RAD 4100 DACS are proposed for DS1 grooming only. VF conference bridge capabilities are not available in these units and are not included in Aviat's proposal.

As VF conference bridges supporting native T1 are not easily available, Aviat recommends re-using existing Tellabs DAC for VF conference bridge functionality and new RAD 4100 DAC for DS1 grooming.



10. TimeProvider 4100- GPS CLOCK

Aviat has proposed Time provider 4100 GPS to replace the existing GPS clock. The proposed clock is protected with a Dual Power Supply and supports a minimum of 4 T1 interface, out of which two can be used as input or out, and two are strictly out.

If a greater number of T1 interfaces are desired, a 20 port T1 module needs to be additionally purchased. This module is not included in Aviat's Bid.



The clock will be monitored via SNMP using Aviat provision system. A complete spare unit for the GPS clock is proposed as an optional item.

11. Power System

It is understood that -48VDC Power Systems will be available on all the sites.

Aviat will provide DC Power Consumption Calculations for microwave radios, routers, and other DC Powered equipment (if any) provided by Aviat.

Aviat's proposal does not include any upgrades to the existing power system or hardware for a new power system.

12. Warranties

Three (3) years of hardware and equipment warranty is included in Aviat's proposal.

13. Training

Aviat's proposal includes onsite training for Eclipse radios, MPLS routers, Management system, and RAD 4100 DACs.

14. Factory Integration and Field Installation Services

Factory Acceptance testing and field installation are included as part of our turnkey solution. Please refer to the Scope of Work document included in the proposal for details.

Our proposed cutover approach, as detailed in this document, is based on a hop-by-hop microwave radio link and traffic/circuit TDM cutover. It must be noted that this approach will result in performing the network 30-day operational burn-in test with live traffic on the system.

15. Tower Structures and Buildings

It is assumed that the towers and buildings are in place and have enough space to accommodate new microwave radios, antennas, and transmission lines (waveguides and IF coaxial cables). Tower structural analysis and/or tower modifications are not included in Aviat's quote. Aviat can provide structural tower analysis, tower reinforcement as required and provide quotes for these services.

16. Cutover

This document describes the transition and migration approaches proposed by Aviat to upgrade the existing County of San Mateo microwave system. It will be expanded after contract award to include additional details on the actual sequencing of the tasks for each Ring as well as the Spurs.

16.1 Upgrade Scope

This upgrade consists of the replacement of the existing radios and antenna systems.

- The antennas will be replaced with the same or smaller antennas installed at the same centerlines as the existing antennas.
- The existing radios are TDM. They will be replaced with new hybrid radios equipped with interfaces allowing the simultaneous operation of both TDM and IP.

16.2 Transition

This migration only involves a cutover of TDM traffic. The IP traffic will be added to the new system after the cutover of TDM traffic, system testing, and decommissioning of the existing radios.

Aviat has proposed using two crews during the cutover on either side of the hop to reduce the downtime.

16.2.1 Ring upgrade

It is proposed to replace one hop at a time, starting from the master site COB2, where all T1s are terminated and progressing Clockwise (CW) or Counterclockwise (CCW) until all hops have been replaced around the Ring.

The ProVision Network Management system will be installed at the master site at the same time as the new radios to allow immediate monitoring of the new radio sections from the time they start carrying live traffic.

During the interim period of the replacement, the Ring will consist of 2 linear sections, both originating from the master site: new radios, progressing CW or CCW over TDM - IP; existing radios regressing CW or CCW over OC-3.

Each section will carry part of the traffic, depending on which site it is being dropped. During cutover, T1s dropped between 2 loop sites may need to be temporarily re-routed over both the new and existing sections in order to provide continuity between both sections. Those T1s will be dropped to the jackfields of existing and new radios at the Master Site and cross-connected using jumpers.

Please note that the Ring will be unprotected until all hops are replaced and converted to TDM-IP.

Once the project is awarded, Aviat will work with the customer to come up with a cutover plan.

Aviat has included sample cutover plans for other systems, which they have implemented in the past for customer reference on how a detailed cutover over plan would look like.

16.2.2 Spur upgrade

The radio and antenna systems will be replaced the same way as the ring hops. Hop testing and T1continuity will be verified across the new hop, then T1 traffic will be cutover to the new radio hops.

There will be a 6-8 hrs outage during the time required to replace the antenna systems at each end. It will be minimized by simultaneously replacing antenna systems at both ends using two (2) crews.

16.2.3 Motorola P25 Astro system to IP/MPLS transport

As per the information Aviat has received from County's P25 vendor Motorola, they are working on an SUA agreement with the County for the Motorola Astro P25 systems upgrades.

Aviat requested a quote from Motorola for the LMR integration with the microwave upgrade.

The pricing for Motorola integration is shown as optional item and not included in Aviat Main Bid.

Below are the assumptions made by Motorola

- Motorola Solutions (Motorola) assumes San Mateo County will move forward with the Lifecycle Sustainment and Maintenance Services proposal, which provides the upgrade of GGM8000 site routers, S6000 prime site routers, and HP switches with Juniper routers, SRX1500 prime site routers, and Aruba switches, respectively. The Radio Network Infrastructure (RNI) equipment and replacement services are provided in the Lifecycle Sustainment and Maintenance Services proposal and are outside the scope of this offering.
- The GGM to Juniper ASTRO Conversion equipment will be installed at the same time as the Microwave Upgrade solution.
- The existing prime site and RF subsites will have Juniper SRX routers installed as part of the T1 to Ethernet conversion.
- All existing sites or equipment locations will have sufficient space available for the system described as required/specified by R56.
- All existing sites or equipment locations will have adequate electrical power (and backup power, if necessary) in the proper phase and voltage and site grounding to support the requirements of the system described.

- All required approved local, State, or Federal, FCC/FAA, and any other permits as may be required for the installation and operation of the proposed equipment are the responsibility of San Mateo County.
- Any necessary demarcation points are defined as the Motorola Solutions provided equipment. This includes demarcation for the following services:
    - 120VAC/ -48DC Power & Circuits
    - Backup Power
    - Grounding
    - Communication Circuits and backhaul links between sites
- Motorola network demarcation points are as follows:
    - Core Backhaul Switches at the ASTRO Core (Cores, Exits, and SRX Edges)
    - Simulcast Backhaul Switches in an IP Simulcast Prime Site Access (SRX PAR to Subsites)
    - ASTRO 25 Gateway at all other sites (ASTRO25, Conventional Only, IP Simulcast Primes (SRX PAR to Core) and Subsites, CSub Hubs and BR Sites, and Dispatch.
- San Mateo County will provide internet access at the customer site for a secure remote VPN tunnel to assist with integration activities.
- San Mateo County will be responsible for any and all site/location upgrades or modifications that are necessary to support the designed system. This includes but is not limited to:
    - Cable tray expansion
    - Floor space/loading
    - Electrical/Power sourcing
    - Including backup power
    - HVAC
    - NEC/R56-Compliant grounding system
    - Tower loading analysis and expansion
    - Work-suitability (adequate lighting and physical space)
    - Site access (e.g., road maintenance and access during extreme weather or conditions)
- San Mateo County will be responsible for providing adequate connection points to an NEC- and 56-compliant grounding system for each rack and/or device**.**

Motorola recommends a high availability layer 3 Ethernet backhaul to support ASTRO 25 Public safety voice traffic. Also required is an underlying MPLS transport layer with virtual routed private network (VRPN / L3VPN) layer-3 services for ASTRO site links.

Microwave and radio system design requires two (2) routers / separate network interfaces at each site. Also, 3 or 4 QOS service levels are recommended.

Ring Convergence and network protection:

In order to maintain wide area trunking on sites that utilize Ethernet Site Links, it is imperative that the provided backhaul does not queue or drop any packets from ingress demarcation to egress demarcation for more than the following amount of time (this would be considered a network backhaul outage):

- Repeater Site Links (including IP Trunked Simulcast Prime: 2 seconds
- IP Trunked Simulcast Sub-Site Links: 800 milliseconds
- MCC7500 Console/NM Dispatch Site Links: 1.2 seconds

Performance of backhaul network:

Link Latency:

- Trunked repeater site and trunked repeater site/dispatch site: 100ms with a late join constraint: Destination link latency – Source link latency < 85ms

- Dispatch site and Trunked repeater site: 70ms with a late join constraint: Destination link latency – Source link latency < 37ms
- IP trunked simulcast site to IP trunked simulcast site/dispatch site/ASR site and vice versa: 40ms

Jitter:

- ASR Site, Dispatch Site, or Prime site to Master site:
- In non-simulcast configurations, the jitter budget needs to be kept to 20 ms* or less.
- Simulcast remote subsite to prime site to Master site:
- In simulcast situations, the subsite to prime site link can tolerate additional jitter. This link can support an additional 10 ms* or less jitter.

Packet Loss:

Packet loss is defined per RFC 2680. The specification for end to end packet loss is no more than 0.01%. Packet loss is additive and can be combined among all the link segments.

Committed Information Rate:

Based on the proposed ring network topology, Motorola recommends allocating 10 Mbps throughput only for ASTRO traffic.

ASTRO specific Link minimal requirements are below:

1. Link between Master site and Dual router HOJ Prime site: Minimum Required Link Speed 6000 kbps.
2. Link between Master Site and COB2 Dual router Conduit Hub: Minimum Required Link Speed 10000 kbps
3. Link between Master site and ASR site with 10 Trunked FDMA voice channels: Minimum Required Link Speed 2000 kbps.

Motorola Network Demarcations

- Motorola network demarcation points are as follows:
  - Core Backhaul Switches at the ASTRO Core (Cores, Exits, and SRX Edges)
  - Simulcast Backhaul Switches in an IP Simulcast Prime Site Access (SRX PAR to Subsites)
  - ASTRO 25 Gateway at all other sites (ASTRO25, Conventional Only, IP Simulcast Primes (SRX PAR to Core) and Subsites, CSub Hubs and BR Sites, and Dispatch.

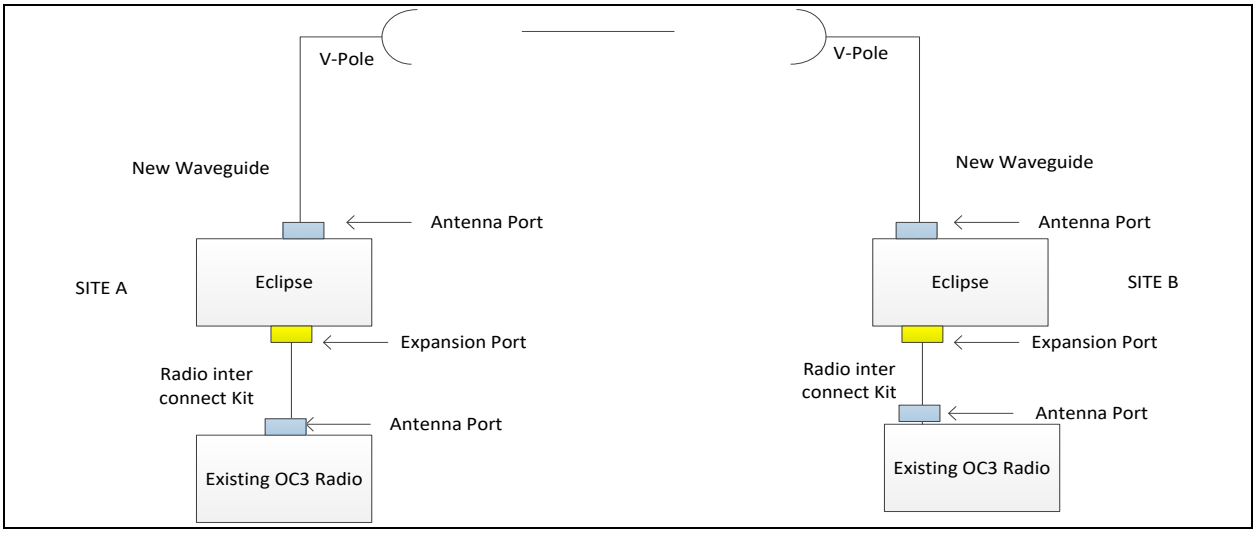
17. Parallel Operation – Proposed to minimize the downtime

To minimize the down, Aviat has proposed a parallel operation for loop hops as optional. Please note the parallel operation is based on the assumption that new frequency and channels are available for new eclipse radios so they can run in parallel with existing OC3 radios. After the bid is awarded, Aviat will perform frequency coordination and can confirm if a parallel operation is possible.

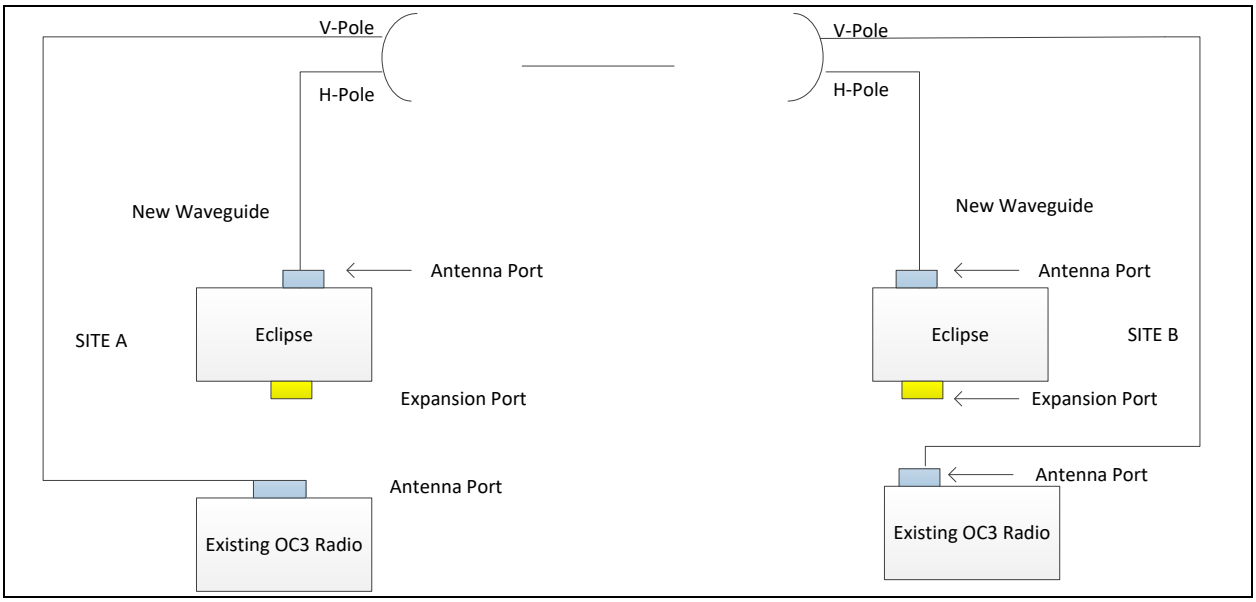
Below is the recommended approach to run both the system in parallel.

- Replace the existing antenna around the loop one by one and install the new antenna and waveguide radios in the shelter.

- For the hops where both the frequencies existing and new are on the same polarization, connect the new waveguide to the antenna port of Eclipse radios and use the expansion port to connect to the existing radio as shown below.



- For the hops where both frequencies, the existing and new, are on different polarization, connect the new waveguide to the antenna port of Eclipse radios and keep the existing waveguide as is and connect to the dual pole antenna provided by Aviat.



For the loop, we will build, test, and run the radios in parallel, once the new hops are up and operational, we can cutover the traffic from existing equipment to new equipment hop by hop or circuit by circuit with minimal downtime.

Aviat has included pricing as to run the loop hops parallel with existing radios, thus minimizing the outages and downtime.

Exhibit D

AVIAT U.S., INC. LIST OF DESCRIPTIONS OF EQUIPMENT AND SERVICES

Aviat U.S., Inc.
200 Wilcrest Drive, Suite C1604
Austin, TX 78726

Company: **[COUNTY OR SHERIFF]**
Attn: Patricia Gonzales
Contact: Communications Center, 3rd FL
550 12th
Riverside City, CA, 92502

Performance System Design and Update - Solicitation Number: RFP# BID-P1021665

MAIN BID+Options

Project Number: MA1502/24-WB-16
Project Date: 11/18/2022
Issue No: A
Technical Author: Jim Hine
Sales Engineer: Shirley Lu
Delivery: Delivery Segment per Contract
Installation: Per Aviat Proposed schedule
Guarantee: 48 days
Freight: Prepaid & Bill, Destination

| EQUIPMENT LIST ITEM DESCRIPTION | PRODUCT CODE PART NUMBER | UNIT PRICE | SYSTEM Q'TY | SYSTEM PRICE | DEL_VALLEJO Q'TY | DEL_VALLEJO PRICE | FOSTER_CITY Q'TY | FOSTER_CITY PRICE | GREENBRAE Q'TY | GREENBRAE PRICE | SAN_BRUNO Q'TY | SAN_BRUNO PRICE | NORTH_PEAK Q'TY | NORTH_PEAK PRICE | HSA Q'TY | HSA PRICE | MT_HAM Q'TY | MT_HAM PRICE | SAN_CARLOS Q'TY | SAN_CARLOS PRICE | DIABLO_PEAK Q'TY | DIABLO_PEAK PRICE | AGN Q'TY | AGN PRICE | SAN_RAMON Q'TY | SAN_RAMON PRICE | SAN_TRANS_DIABLO Q'TY | SAN_TRANS_DIABLO PRICE | SILVIO Q'TY | SILVIO PRICE | MISSION Q'TY | MISSION PRICE | BIG_BEAR_HC Q'TY | BIG_BEAR_HC PRICE | BIG_BEAR_PS Q'TY | BIG_BEAR_PS PRICE | SAN_TRANS_NORTH_BEAR Q'TY | SAN_TRANS_NORTH_BEAR PRICE | WILLOWS_FD Q'TY | WILLOWS_FD PRICE | SILVERADO Q'TY | SILVERADO PRICE | MILL_CREEK_HC Q'TY | MILL_CREEK_HC PRICE | HUNTINGTON Q'TY | HUNTINGTON PRICE | SAN_GABRIEL Q'TY | SAN_GABRIEL PRICE | MONTE_COUNTY_DEMO Q'TY | MONTE_COUNTY_DEMO PRICE | SIERRA_MADRE Q'TY | SIERRA_MADRE PRICE | SAN_LEANDRO Q'TY | SAN_LEANDRO PRICE | SOUTH_SAN_FRANCISCO Q'TY | SOUTH_SAN_FRANCISCO PRICE | MORRILL_SAW Q'TY | MORRILL_SAW PRICE | PACHECO_PS Q'TY | PACHECO_PS PRICE | GOLF_MOUN_BAY_PS Q'TY | GOLF_MOUN_BAY_PS PRICE | PARSON_POINT Q'TY | PARSON_POINT PRICE | PEACHWOOD Q'TY | PEACHWOOD PRICE | PINE_PASS Q'TY | PINE_PASS PRICE | SAN_CARLOS_PS Q'TY | SAN_CARLOS_PS PRICE | OLDWEST_ASSISLA Q'TY | OLDWEST_ASSISLA PRICE | OAKLAND_PARK Q'TY | OAKLAND_PARK PRICE | TOWN_WOOD Q'TY | TOWN_WOOD PRICE | LAKEHEAD Q'TY | LAKEHEAD PRICE | Bucks Q'TY | Bucks PRICE | Bucks Q'TY | Bucks PRICE |
|---|---|---

| | EQUIPMENT LIST | PRODUCT CODE | UNIT | SYSTEM | SAN JOSE - JUNIPER | | CUPERTINO | | SUNNYVALE-WEST | | SAN CARLOS | | SAN FRANCISCO-BAYSHORE | | REDWOOD CITY | | MENLO PARK | | BELMONT | | SAN LUIS OBISPO | | SANTA BARBARA | | SAN BUENAVENTURA | | SIMI VALLEY | | LOS ANGELES - DOWNTOWN | | LOS ANGELES - WESTWOOD | | SANTA MONICA | | TORRANCE | | LONG BEACH | | IRVINE | | SAN DIEGO - KEARNY MESA | | SAN DIEGO - OLD TOWN | | SAN DIEGO - MISSION VALLEY | | SAN DIEGO - CARLSBAD | | SAN DIEGO - CHULA VISTA | | SAN DIEGO - OCEANSIDE | | SAN DIEGO - RANCHO BERNARDO | | SAN DIEGO - SORRENTO VALLEY | | SAN DIEGO - SCRIPPS RANCH | | SOUTH SAN FRANCISCO - 901 | | MODESTO - SAINT | | PACIFICA #2 | | GOLF BOOTS BAY #5 | | FOSTER RIVER | | REDWOOD | | PALO ALTO | | SAN CARLOS #2 | | LA CRESTA - JUANITA | | HOWARD PARK | | TEMPLETON | | TEMPLETON | | Services | |
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Exhibit D

AVIAT U.S., INC. LIST OF DESCRPTIONS OF EQUIPMENT AND SERVICES

County of San Mateo Contract List of Decriptions of Equipment and Services

Aviat U.S., Inc. List of Descriptions of Equipment and Services Main Proposal		
Item	Description	Price
Section 1	Eclipse IRU600 and ODU600	$ 871,715.00
	-IRU600 6/11 GHz along with WG extension kit	
	-ODU 600 6/11/18 GHz	
Section 2	INUe, DAC and licenses	$ 551,219.00
	-Eclipse INUe with all DS1 cards, Loop protection cards	
	-Capacity license and all other feature licenses	
Section 3	PV and PV+	$ 170,332.00
	PV hardware and Software	
	PV+	
	GDS package for clock and DACS	
Section 4	CTR Routers	$ 212,204.00
Section 5	Rack and mis equipment	$ 117,086.00
Section 6	DSX-1 JK, clocking and RAC DACS	$ 93,521.00
Section 7	Antenna system, WG, IF cables and accessories	$ 418,881.00
Section 8	Warranty, 3 years	$ 106,985.00
	Router	
	PV+	
Section 9	services	
	SIPQ	$ 158,063.00
	services	$ 1,980,450.00
	SIPQ	
	NDE	
	NI	
Section 10	Training	$ 63,039.00
	Router training	
	total before discount	$ 4,743,495.00
	one time management discount	$ (626,429.00)
	one time management discount (order before 9/23/2022)	$ (62,969.00)
	Freight	$ 72,135.00
	Tax	$ 179,498.00
	Grand total including discount and tax	$ 4,305,730.00
		$ 377,866.00
Summary/ List of Included Option Items		
Section 13	Additional TDM, Loop switch cards for hardware redundancy	$ 66,434.00
Section 14	Feature licenses to support SynE	$ 179,250.00
Section 15	Feature license to support 1588v2 PTP	$ 24,577.00
Section 16	Spares	$ 173,579.00
Section 17	New Antenna Mount materials and labor	$ 132,425.00
Section 18	Additional material and service required for parallel hops for cut over	$ 66,989.00
	Additional cost to upgrade antennas with Sentinel antennas	
Section 20	10 years FAS for 6 GHz hops	$ 33,314.00
Section 21	LMR integration with the microwave upgrade project	$ 521,449.00
Section 22	Network Health Services	$ 83,087.00
Section 23	Additional 3 years warranty	$ 234,963.00
Section 24	Adding CTR 8740 MPLS Routers on the spurs	$ 629,635.00
	Freight	included in each section above
	tax 9.875%	included in each section above
	Total for Options including Tax and Freight	$ 2,145,702.00
Grand Total for Main Proposal and List of Included Options		**$ 6,451,432.00**

Aviat U.S., Inc.
200 Parker Drive, Suite C100A
Austin, TX 78728

Company **County of San Mateo, CA**
Attn
Contact

County of San Mateo Contract Menu Pricing for Equipment. Pricing is valid from September 13, 2022 to September 12, 2025.

ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
1.000	**Outdoor RF Section, ODU600v2**					
						
1.001	PLANNING MODEL ODU 600v2, Lower 06 GHz	M-ECH-06-LOW	$10,392	65.00	$6,755	$3,637
1.002	PLANNING MODEL ODU 600v2, Upper 06 GHz	M-ECH-06-HIGH	$10,392	65.00	$6,755	$3,637
1.003	ODU 600v2, 11 GHZ, PLANNING PART NUMBER	M-ECH-11	$10,392	65.00	$6,755	$3,637
1.004	ODU 600v2, 18 GHZ, PLANNING PART NUMBER	M-ECH-18	$10,392	65.00	$6,755	$3,637
1.005	ODU 600v2, 23 GHZ, PLANNING PART NUMBER	M-ECH-23	$10,392	65.00	$6,755	$3,637
1.006	Remote Mount Bracket Assembly ODU600v2	179-530502-001	$201	28.00	$56	$145
1.007	ODU600v2 INDOOR VERTICAL RACK MOUNT	086-523260-002	$456	28.00	$128	$328
1.008	ECLIPSE FLEX WG, 5.925 - 7.125 GHZ, 900MM, PDR70-CPR137 (S137CHS3-A)	086-068137-900	$357	28.00	$100	$257
1.009	HANGER, DUAL MOUNT HANGER KIT, FOR FLEXIBLE WAVEGUIDE, SIZE WG14 / WR137 / R70, POLE	018-510100-001	$27	28.00	$8	$19
1.010	ECLIPSE FLEXIBLE WAVEGUIDE, 10.15-11.7 GHZ, 900MM, PDR100-CPR90G	086-118090-900	$305	28.00	$85	$220
1.011	FLEX TWIST HANGER KIT FOR WR90, WG16 AND R100, 11 GHZ (244106A-100)	018-510102-002	$139	28.00	$39	$100
1.012	ECLIPSE FLEXIBLE WAVEGUIDE, 17.70-26.50 GHZ, 900MM, PBR220-UG595	086-188596-900	$814	28.00	$228	$586
1.013	FLEX-TWIST HANGER KIT FOR WR42, WG20 AND R220, 18-26 GHZ (244106A-220)	018-510105-002	$88	28.00	$25	$63
1.014	Coupler Assy ODU 600v2 , 6 GHz Equal 3 dB, V and H Pole (840D606H1A)	086-523300-063	$822	28.00	$230	$592
1.015	Coupler Assy ODU 600v2 , 6 GHz Unequal 6 dB, V and H Pole (840D606H1B)	086-523300-066	$921	28.00	$258	$663
1.016	Coupler Assy ODU 600v2 , 10/11 GHz Equal 3 dB, V and H Pole (840D611H1A)	086-523300-113	$863	28.00	$242	$621
1.017	Coupler Assy ODU 600v2 , 10/11 GHz Unequal 6 dB, V and H Pole (840D611H1B)	086-523300-116	$863	28.00	$242	$621
1.018	Coupler Assy ODU 600v2 , 18 GHz Equal 3 dB, V and H Pole (840D618H1A)	086-523300-183	$921	28.00	$258	$663
1.019	Coupler Assy ODU 600v2 , 18 GHz Unequal 6 dB, V and H Pole (840D618H1B)	086-523300-186	$921	28.00	$258	$663
1.020	Coupler Assy ODU 600v2 , 23 GHz Equal 3 dB, V and H Pole (840D623H1A)	086-523300-233	$978	28.00	$274	$704
1.021	Coupler Assy ODU 600v2 , 23 GHz Unequal 6 dB, V and H Pole (840D623H1B)	086-523300-236	$921	28.00	$258	$663
1.022	Coupler Assy XPIC 600V2 6 GHz OMT Assembly (860D606H01)	086-523302-006	$975	28.00	$273	$702
1.023	Coupler Assy XPIC 600V2 10/11 GHz OMT Assembly (860D611H01)	086-523302-011	$993	28.00	$278	$715
1.024	Coupler Assy XPIC 600V2 18 GHz OMT Assembly (860D618H01)	086-523302-018	$903	28.00	$253	$650
1.025	Coupler Assy XPIC 600V2 23 GHz OMT Assembly (860D623H01)	086-523302-023	$801	28.00	$224	$577
1.026	WTM 4100/4200 ODU600v2 6 GHz Waveguide Transition Kit, WR 137 waveguide, UDR 70 flange	179-530500-006	$267	28.00	$75	$192
1.027	WTM 4100/4200 ODU600v2 10/11 GHz Waveguide Transition Kit, WR 90 waveguide, UDR 100 flange	179-530500-011	$265	28.00	$74	$191
1.028	WTM 4100/4200 ODU600v2 18/23 GHz Waveguide Transition Kit, WR 42 waveguide, UBR220 flange	179-530500-018	$267	28.00	$75	$192
1.029	KIT, LIGHTNING ARRESTOR, UNIVERSAL, 50 OHM, MALE TO FEMALE	179-530062-002	$77	28.00	$22	$55
1.030	ODU/IDU Level 2 Terminal Assy & RF Link Test Service	VAS-ODUIDU-002	$150			$150
1.100	**Indoor RF Section, IRU600v4**					
						
1.101	IRU600v4 RFSEC ASSY NP, IF TR SP-HP L6 GHz, Filter-non ACCP, 60 MHz	EV202-AML-000-416000	$25,811	65.00	$16,777	$9,034
1.102	IRU600v4 RFSEC ASSY NP, IF TR SP-HP 5.8-U6 GHz, Filter-non ACCP	EV202-AMT-000-410000	$25,811	65.00	$16,777	$9,034
1.103	IRU600v4 RFSEC ASSY NP, IF TR EHP L6 GHz, Filter-non ACCP	EV202-AEL-000-410000	$34,848	65.00	$22,651	$12,197
1.104	IRU600v4 RFSEC ASSY NP, IF TR EHP L6 GHz, Filter-non ACCP, 60 MHz	EV202-AEL-000-416000	$34,848	65.00	$22,651	$12,197
1.105	IRU600v4 RFSEC ASSY NP, IF TR EHP U6 GHz, Filter-non ACCP	EV202-AEU-000-410000	$34,848	65.00	$22,651	$12,197
1.106	IRU600v4 RFSEC ASSY NP, IF TR SP-HP 11 GHz, Filter-non ACCP, 80 MHz (EV202-AMC-000-418000)	EV202-AMB-000-418000	$27,167	65.00	$17,659	$9,508
1.107	IRU600v4 RFSEC ASSY NP, IF TR SP-HP 10.5-11 GHz, Filter-non ACCP	EV202-AMC-000-410000	$25,811	65.00	$16,777	$9,034
1.108	IRU600v4 RFSEC ASSY NP, IF TR EHP 11 GHz, Filter-non ACCP	EV202-AEB-000-410000	$34,848	65.00	$22,651	$12,197
1.109	IRU600v4 RFSEC ASSY NP, IF TR EHP 11 GHz, Filter-non ACCP, 80 MHz	EV202-AEB-000-418000	$36,204	65.00	$23,533	$12,671
1.110	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR SP-HP 5.8-U6 GHz, Filter-non ACCP	EV206-AMT-AM0-410000	$44,026	65.00	$28,617	$15,409
1.111	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR SP-HP L6 GHz, Filter-non ACCP, 60 MHz	EV206-AML-AM0-416000	$44,026	65.00	$28,617	$15,409
1.112	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR EHP L6 GHz, Filter-non ACCP	EV206-AEL-AE0-410000	$62,100	65.00	$40,365	$21,735
1.113	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR EHP L6 GHz, Filter-non ACCP, 60 MHz	EV206-AEL-AE0-416000	$62,100	65.00	$40,365	$21,735
1.114	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR EHP U6 GHz, Filter-non ACCP	EV206-AEU-AE0-410000	$62,100	65.00	$40,365	$21,735
1.115	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR SP-HP 10.5-11 GHz, Filter-non ACCP	EV206-AMC-AM0-410000	$44,026	65.00	$28,617	$15,409
1.116	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR SP-HP 10.5-11 GHz, Filter-non ACCP, 80 MHz (EV206-AMC-AM0-418000)	EV206-AMB-AM0-418000	$45,382	65.00	$29,498	$15,884
1.117	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR EHP 11 GHz, Filter-non ACCP	EV206-AEB-AE0-410000	$62,100	65.00	$40,365	$21,735
1.118	IRU600v4 RFSEC ASSY MHSB RX UNEQUAL SPLIT, IF TR EHP 11 GHz, Filter-non ACCP, 80 MHz	EV206-AEB-AE0-418000	$63,455	65.00	$41,246	$22,209
1.119	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR SP-HP 5.8-U6 GHz, Filter-non ACCP	EV207-AMT-AM0-410000	$46,003	65.00	$29,902	$16,101
1.120	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR SP-HP L6 GHz, Filter-non ACCP, 60 MHz	EV207-AML-AM0-416000	$46,003	65.00	$29,902	$16,101
1.121	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR EHP L6 GHz, Filter-non ACCP	EV207-AEL-AE0-410000	$64,077	65.00	$41,650	$22,427
1.122	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR EHP L6 GHz, Filter-non ACCP, 60 MHz	EV207-AEL-AE0-416000	$64,077	65.00	$41,650	$22,427
1.123	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR EHP U6 GHz, Filter-non ACCP	EV207-AEU-AE0-410000	$64,077	65.00	$41,650	$22,427
1.124	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR SP-HP 10.5-11 GHz, Filter-non ACCP	EV207-AMC-AM0-410000	$46,003	65.00	$29,902	$16,101

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ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
1.125	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR SP-HP 10.5-11 GHz, Filter-non ACCP, 80 MHz (EV207-AMC-AM0-418000)	EV207-AMB-AM0-418000	$47,359	65.00	$30,783	$16,576
1.126	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR EHP 11 GHz, Filter-non ACCP	EV207-AEB-AE0-410000	$64,077	65.00	$41,650	$22,427
1.127	IRU600v4 RFSEC ASSY MHSB/SD TX SWITCH, IF TR EHP 11 GHz, Filter-non ACCP, 80 MHz	EV207-AEB-AE0-418000	$65,432	65.00	$42,531	$22,901
1.128	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR EHP L6 GHz, Filter-non ACCP	EV208-AEL-AEL-410000	$66,392	65.00	$43,155	$23,237
1.129	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR EHP L6 GHz, Filter-non ACCP, 60 MHz	EV208-AEL-AEL-416000	$66,392	65.00	$43,155	$23,237
1.130	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR EHP U6 GHz, Filter-non ACCP	EV208-AEU-AEU-410000	$66,392	65.00	$43,155	$23,237
1.131	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR SP-HP L6 GHz, Filter-non ACCP, 60 MHz	EV208-AML-AML-416000	$48,319	65.00	$31,407	$16,912
1.132	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR SP-HP 5.8-U6 GHz, Filter-non ACCP	EV208-AMT-AMT-410000	$48,319	65.00	$31,407	$16,912
1.133	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR SP-HP 11 GHz, Filter-non ACCP, 80 MHz	EV208-AMB-AMB-418000	$48,997	65.00	$31,848	$17,149
1.134	IRU600v4 RFSEC ASSY SD SPLIT TX, IF TR SP-HP 10.5-11 GHz, Filter-non ACCP	EV208-AMC-AMC-410000	$48,319	65.00	$31,407	$16,912
1.135	WG EXT KIT IRU600 V3 6GHZ SH1-PO1, 1+0/MHSB 1ANT, RPTR(MAIN)	179-530135-AA101	$531	28.00	$149	$382
1.136	WG EXT KIT IRU600 V3 6GHZ SH1-PO1, 1+0/MHSB 2 ANT, MHSB/SD	179-530135-AA103	$2,412	28.00	$675	$1,737
1.137	WG EXT KIT IRU600 V3 11GHZ SH1-PO1, 1+0/MHSB 1ANT, RPTR(MAIN)	179-530135-AA121	$525	28.00	$147	$378
1.138	WG EXT KIT IRU600 V3 11GHZ SH1-PO1, 1+0/MHSB 2 ANT, MHSB/SD	179-530135-AA123	$1,066	28.00	$298	$768
1.139	WG EXT KIT IRU600 V3 6GHZ SH2-PO2, 1+0/MHSB 1ANT, RPTR(MAIN)	179-530135-BB201	$1,738	28.00	$487	$1,251
1.140	WG EXT KIT IRU600 V3 6GHZ SH2-PO2, 1+0/MHSB 2 ANT, MHSB/SD (179-530135-BB203)	179-530135-BB203	$2,802	28.00	$785	$2,017
1.141	WG EXT KIT IRU600 V3 11GHZ SH2-PO2, 1+0/MHSB 1ANT, RPTR(MAIN) (179-530135-BB221)	179-530135-BB221	$1,590	28.00	$445	$1,145
1.142	WG EXT KIT IRU600 V3 11GHZ SH2-PO2, 1+0/MHSB 2 ANT, MHSB/SD (179-530135-BB223)	179-530135-BB223	$2,758	28.00	$772	$1,986
1.143	WG EXT KIT IRU600 V3 6GHZ SH3-PO3, 1+0/MHSB 1ANT, RPTR(MAIN) (179-530135-CC301)	179-530135-CC301	$2,293	28.00	$642	$1,651
1.144	WG EXT KIT IRU600 V3 6GHZ SH3-PO3, 1+0/MHSB 2 ANT, MHSB/SD (179-530135-CC303)	179-530135-CC303	$3,913	28.00	$1,096	$2,817
1.145	WG EXT KIT IRU600 V3 11GHZ SH3-PO3, 1+0/MHSB 1ANT, RPTR(MAIN) (179-530135-CC321)	179-530135-CC321	$2,045	28.00	$573	$1,472
1.146	WG EXT KIT IRU600 V3 11GHZ SH3-PO3, 1+0/MHSB 2 ANT, MHSB/SD (179-530135-CC323)	179-530135-CC323	$3,821	28.00	$1,070	$2,751
1.147	WG EXT KIT IRU600 V3 6GHZ SH4-PO4, 1+0/MHSB 1ANT, RPTR(MAIN) (179-530135-DD401)	179-530135-DD401	$2,273	28.00	$636	$1,637
1.148	WG EXT KIT IRU600 V3 6GHZ SH4-PO4, 1+0/MHSB 2 ANT, MHSB/SD (179-530135-DD403)	179-530135-DD403	$4,472	28.00	$1,252	$3,220
1.149	WG EXT KIT IRU600 V3 11GHZ SH4-PO4, 1+0/MHSB 1ANT, RPTR(MAIN) (179-530135-DD421)	179-530135-DD421	$2,077	28.00	$582	$1,495
1.150	WG EXT KIT IRU600 V3 11GHZ SH4-PO4, 1+0/MHSB 2 ANT, MHSB/SD (179-530135-DD423)	179-530135-DD423	$5,027	28.00	$1,408	$3,619
1.151	EXT BRKT KIT IRU600 2 SHELF (179-530089-001 REV002)	179-530089-001	$294	28.00	$82	$212
1.152	EXT BRKT KIT IRU600 3 SHELF (179-530089-002 REV002)	179-530089-002	$587	28.00	$164	$423
1.153	EXT BRKT KIT IRU600 4 SHELF (179-530089-003 REV002)	179-530089-003	$881	28.00	$247	$634
2.000	**Eclipse INUe**					
						
2.001	ECLIPSE, INTELLIGENT NODE UNIT 2RU, INC IDCE, FAN, NCCV3, HIGH OUTPUT	EXX-000-205	$3,463	65.00	$2,251	$1,212
2.002	KIT BRACKET 2RU	179-530064-001	$37	30.00	$11	$26
2.003	Network Equipment Building Systems, 2RU	179-530053-002	$326	30.00	$98	$228
2.004	NODE PROTECTION CARD, HIGH OUTPUT	EXS-002	$802	65.00	$521	$281
2.005	RAC 70v2, QPSK-4096QAM, NO XPIC, ACM	EXR-700-002	$2,254	65.00	$1,465	$789
2.006	RAC 7Xv2, QPSK-4096QAM, XPIC, ACM	EXR-770-002	$3,784	65.00	$2,460	$1,324
2.007	DAC GE3 GIGABIT ETHERNET SWITCH CARD	EXD-181-002	$2,542	65.00	$1,652	$890
2.008	ECLIPSE, DAC 16XE1/DS1 V3, PROTECTABLE (EXD-161-002)	EXD-161-002	$892	65.00	$580	$312
2.009	AUX, ALARM I/O CARD	EXA-001	$706	65.00	$459	$247
2.010	NODE SW LICENSE,50 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08001	$339	65.00	$220	$119
2.011	NODE SW LICENSE, 100 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08002	$1,412	65.00	$918	$494
2.012	NODE SW LICENSE, 150 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08003	$3,389	65.00	$2,203	$1,186
2.013	NODE SW LICENSE, 200 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08004	$5,648	65.00	$3,671	$1,977
2.014	NODE SW LICENSE, 300 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08005	$8,472	65.00	$5,507	$2,965
2.015	NODE SW LICENSE, 400 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08006	$11,296	65.00	$7,342	$3,954
2.016	NODE SW LICENSE, 800 Mbps TOTAL RADIO PAYLOAD CAPACITY	EZE-08007	$13,555	65.00	$8,811	$4,744
2.017	LAYER 1 LINK AGGREGATION NODAL ON DAC GE / DAC GE3	EZF-01	$508	25.00	$127	$381
2.018	ADAPTIVE MODULATION NODAL RAC60/6X/60E/6XE	EZF-02	$1,694	25.00	$424	$1,270
2.019	SECURE MANGEMENT, INU, inc SNMPV3 NODAL	EZF-03	$3,111	25.00	$778	$2,333
2.020	PAYLOAD ENCRYPTION NODAL RAC60/6X/60E/6XE	EZF-04	$2,074	25.00	$519	$1,555
2.021	RADIUS CLIENT, NODAL CENTRALIZED USER ACCT MGMT	EZF-06	$778	25.00	$195	$583
2.022	ODU 600 Nodal High power option 1 x ODU	EZF-51	$1,694	65.00	$1,101	$593
2.023	ODU 600 Nodal High power option 2 x ODU	EZF-52	$3,389	65.00	$2,203	$1,186
2.024	ODU 600 Nodal High power option 3 x ODU	EZF-53	$5,083	65.00	$3,304	$1,779
2.025	ODU 600 Nodal High power option 4 x ODU	EZF-54	$6,778	65.00	$4,406	$2,372
2.026	IRU600 600 High power option 1 x RFU	EZF-61	$3,389	65.00	$2,203	$1,186
2.027	IRU600 600 Nodal High power option 2 x RFU	EZF-62	$6,778	65.00	$4,406	$2,372
2.028	IRU600 600 Nodal High power option 3 x RFU	EZF-63	$10,166	65.00	$6,608	$3,558
2.029	IRU600 600 Nodal High power option 4 x RFU	EZF-64	$13,555	65.00	$8,811	$4,744
3.000	**CTR 8740**					
						
3.001	CTR 8740 with Std Sync option, Fan Assembly, Blank cover plates, Install kit, DC power, incl SD card, Software and Base License	CTE-740-001	$7,563	65.00	$4,916	$2,647
	Optional Redundant Power Supply			65.00		
3.002	CTR 8500 Series Redundant Power Supply Module, 48VDC	CTS-100-001	$819	65.00	$532	$287
	Each chassis has three SFP+ ports					
3.003	SFP+ OPT TRANSCEIVER, 10Gbit , 850nm, 300m, MM, I TEMP (LX4001IDR-AAN)	079-422677-001	$136	30.00	$41	$95
3.004	SFP+ OPT TRANSCEIVER, 10Gbit-LR/LW, 1310nm, 10km, SM, DUPLEX, LC, I TEMP (LX4002IDR-AAN)	079-422678-001	$250	30.00	$75	$175
3.005	SFP+ OPT TRANSCEIVER, 10Gbit-LR/LW, 1310nm, 1.4km, SM, DUPLEX, LC, I TEMP (SPP-10E-LR-IDFR)	079-422679-001	$193	30.00	$58	$135
	Each chassis has eight SFP ports					
3.006	GIG ETH SFP, OPT MMF 850nm LC 1000BASE-SX, <550M (LM28-C3S-TC-N)	079-422662-001	$72	30.00	$22	$50
3.007	GIG ETH SFP, OPT SMF 1310nm LC 1000BASE-LX, <10 KM (SP-GB-LX-CNFM)	079-422656-001	$86	30.00	$26	$60
3.008	GIG ETH SFP, OPT SMF 1550nm LC 1000BASE-ZX, <70KM (LS48-C3U-TC-N)	079-422665-001	$599	30.00	$180	$419
3.009	GIG ETH SFP, ELEC RJ45 1000BASE-T, CTR ONLY (with RX_LOS) (LX1801CNL-AAN)	083-845537-001	$129	30.00	$39	$90
	Choose one of the following software licenses					
3.010	CTR 8700 Series R3 BASE Software License	CZL-67300	$908	60.00	$545	$363
3.011	CTR 8700 Series R3 CARRIER ETHERNET Software License	CZL-67310	$1,815	60.00	$1,089	$726

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ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
3.012	CTR 8700 Series R3 MPLS Software License	CZL-67350	$5,446	60.00	$3,268	$2,178
	Optional feature licenses					
3.013	CTR 8700 L1 LINK AGGREGATION (ONE LICENSE PER CHASSIS)	CZF-67040	$875	60.00	$525	$350
3.014	CTR 8700 1588v2 PTP TRANSPARENT CLOCK (ONE LICENSE PER CHASSIS)	CZF-67100	$1,440	60.00	$864	$576
3.015	CTR 8700 HIGH AVAILABILITY SWITCH / ROUTER WITH RADIO PROTECTION (ONE LICENSE PER CHASSIS)	CZF-67125	$2,118	60.00	$1,271	$847
	Optional Security Licenses					
3.016	CTR 8700 SECURE AUTHENTICATION CLIENT, CENTRALIZED USR ACCT WITH TACACS+ (ONE LICENSE PER CHASSIS)	CZF-67050	$778	60.00	$467	$311
3.017	CTR 8700 SECURE MANAGEMENT NODAL LICENSE (ONE LICENSE PER CHASSIS)	CZF-67060	$2,001	60.00	$1,201	$800
3.018	LEVEL A CTR8740 CHASSIS ASSEMBLY/SW LOAD	VAS-CTR8740-00A	$52	60.00	$31	$21
3.100	**CTR 8740 Spares**					
3.101	Spare CTR 8740 - No SD Card - Std Sync option, Fan Assembly, Blank cover plates, Install kit, DC power	CTE-S740-001	$7,450	60.00	$4,470	$2,980
3.102	CTR 8500 Series Redundant Power Supply Module, 48VDC	CTS-100-001	$819	60.00	$491	$328
3.103	SFP+ OPT TRANSCEIVER, 10Gbit , 850nm, 300m, MM, I TEMP (LX4001IDR-AAN)	079-422677-001	$136	28.00	$38	$98
3.104	SFP+ OPT TRANSCEIVER, 10Gbit-LR/LW, 1310nm, 10km, SM, DUPLEX, LC, I TEMP (LX4002IDR-AAN)	079-422678-001	$250	28.00	$70	$180
3.105	SFP+ OPT TRANSCEIVER, 10Gbit-LR/LW, 1310nm, 1.4km, SM, DUPLEX, LC, I TEMP (SPP-10E-LR-IDFR)	079-422679-001	$193	28.00	$54	$139
3.106	GIG ETH SFP, OPT MMF 850nm LC 1000BASE-SX, <550M (LM28-C3S-TC-N)	079-422662-001	$72	28.00	$20	$52
3.107	GIG ETH SFP, OPT SMF 1310nm LC 1000BASE-LX, <10 KM (SP-GB-LX-CNFM)	079-422656-001	$86	28.00	$24	$62
3.108	GIG ETH SFP, OPT SMF 1550nm LC 1000BASE-ZX, <70KM (LS48-C3U-TC-N)	079-422665-001	$599	28.00	$168	$431
3.109	GIG ETH SFP, ELEC RJ45 1000BASE-T, CTR ONLY (with RX_LOS) (LX1801CNL-AAN)	083-845537-001	$129	28.00	$36	$93
3.200	**CTR 8740 Warranty**					
3.201	WARRANTY PLUS IW- WORLD WIDE ,24 MONTHS, CTR 87XX w/Base or CE IMAGE	SWW-BWXXA1002453	$234	25.00	$59	$175
3.202	WARRANTY PLUS NW- WW, 12 MONTHS, CTR 87XX w/Base or CE IMAGE	SWW-BNWXA1001253	$317	25.00	$79	$238
4.000	**Racks , DSX-1 jackfield and Eclipse Accessories**					
4.001	RACK ASSY CRATED, 7' CHATSWORTH ALUMINUM, 1 BREAKER PNL W/10 BLANK COVERS AND NO BREAKERS	179-530107-0113	$2,809	28.00	$787	$2,022
4.002	RACK ASSY, NO RACK, NO CRATE, 1 BREAKER PNL W/10 BLANK COVERS AND NO BREAKERS	179-530107-9910	$1,098	28.00	$307	$791
4.003	Installation Kit, Aluminum Rack, Concrete Floor (AV179-530119-001WA)	179-530119-001	$1,110	28.00	$311	$799
4.004	GROUND BAR,KIT,RACK,R56 COMPLIANT,72 INCHES L X 5/8 INCHES WIDE X 1/4 INCHES DEPTH (TRGBVKIT145872AWA)	LOC-TRGBVKIT145872W	$1,016	28.00	$284	$732
4.005	CHANNEL MOUNTING,FORWARD,U-SHAPE,1 RU,4 INCHES LONG X 5/8 INCHES WIDE X 1.75 INCHES DEPTH (020-018475-005 REV001)	020-018475-005	$36	28.00	$10	$26
4.006	COMMON BREAKERS & BLANKING PLUGS PER RACK PER DRAWING	COMMON-BREAKERS-RACK	$133	28.00	$37	$96
4.007	2x HDR-E50 TO Y JOIN TO 24AWG FREE END 3.5M	037-579408-003	$353	28.00	$99	$254
4.008	CABLE, ALARM I/O, 24AWG, HD15 TO WIREWRAP, 15M	037-579470-015	$191	28.00	$53	$138
4.009	AUX HD26, 2M, SYNC, WIREWRAP (037-579115-001V)	037-579115-001	$79	28.00	$22	$57
4.010	CABLE, ETHERNET, CAT 5E, SHIELDED, 24 AWG, INDOOR/OUTDOOR, BOTH ENDS RJ45 (M) CONNECTORS, 2M (6.56'), BLACK (037-579124-002V REVA)	037-579124-002	$9	28.00	$3	$6
4.011	CABLE, ETHERNET, CAT 5E, SHIELDED, 24 AWG, INDOOR/OUTDOOR, BOTH ENDS RJ45 (M) CONNECTORS, 5M (16.4'), BLACK (037-579125-002V REVA)	037-579125-002	$17	28.00	$5	$12
4.012	CABLE PROT / BRIDGEING GE3, DIRECT FIT, 1M (VAHS-30-0342 REV X2)	037-579461-001	$141	28.00	$39	$102
4.013	GIG ETH SFP, OPT MMF 850nm LC 1000BASE-SX, <550M (LM28-C3S-TC-N)	079-422662-001	$72	28.00	$20	$52
4.014	GIG ETH SFP, OPT SMF 1310nm LC 1000BASE-LX, <10 KM (LS38-C3S-TC-N)	079-422656-001	$86	28.00	$24	$62
4.015	SPLITTER SM LC-LC TO LC 2M	037-579143-001	$62	28.00	$17	$45
4.016	JACKFIELD, LOADED 64 DSX-1 CIRCUITS, TOTAL REAR WIREWRAP (REAR CROSSCONNECT 1-64, REAR WIREWRAP), 19" OR 23"W, 3 RU, 10"D, -48VDC, RED LED (SA-2115-2001)	CNI-SA-2115-2001	$2,575	28.00	$721	$1,854
4.017	DS1 JACKFIELD, FIXED, NO INTERNAL CROSS-CONNECT, LOADED 28 CIRCUITS, 1 RU, 19" OR 23"W, 9"D, FRONT RJ48X INCLUDES AUTOMATIC LOOP BACK FUNCTION, REAR WIREWRAP, NO POWER INPUT (097-0128-0006 T1 DEMARCATION CUSTOMER INTERFACE PANEL EQUIVALENT) (DSX-28P-RJ48)	NSM-DSX-28P-RJ48	$1,883	28.00	$527	$1,356
5.000	**Spares**					
	ODUv2					
5.001	PLANNING MODEL ODU 600v2, Lower 06 GHz	M-ECH-06-LOW	$10,392	65.00	$6,755	$3,637
5.002	ODU 600v2, 11 GHZ, PLANNING PART NUMBER	M-ECH-11	$10,392	65.00	$6,755	$3,637
5.003	ODU 600v2, 18 GHZ, PLANNING PART NUMBER	M-ECH-18	$10,392	65.00	$6,755	$3,637
5.004	ODU 600v2, 23 GHZ, PLANNING PART NUMBER	M-ECH-23	$10,392	65.00	$6,755	$3,637
5.005	**IRUv4**			65.00		
5.006	RFU, MP, IRU600v4 IF TR, 5.8-L6-U6 GHz, 5725-7125 MHz	ERM-ATT-401	$16,944	65.00	$11,014	$5,930
5.007	RFU, EHP, IRU600v4 IF TR, L6 GHz, 5925-6425 MHz	ERE-AL6-401	$25,981	65.00	$16,888	$9,093
5.008	RFU, EHP, IRU600v4 IF TR, U6 GHz, 6400-7125 MHz (ERE-AU6-400)	ERE-AU6-401	$25,981	65.00	$16,888	$9,093
5.009	RFU, MP, IRU600v4 IF TR, 10.5-11 GHz, 10500-11700 MHz	ERM-ACC-401	$16,944	65.00	$11,014	$5,930
5.010	RFU, EHP, IRU600v4 IF TR, 11 GHz, 10700-11700 MHz (ERE-ABB-400)	ERE-ABB-401	$25,981	65.00	$16,888	$9,093
	INUe					
5.011	NODE PROTECTION CARD, HIGH OUTPUT	EXS-002	$802	65.00	$521	$281
5.012	RAC 70, QPSK-4096QAM, NO XPIC, ACM	EXR-700-002	$2,254	65.00	$1,465	$789
5.013	RAC 7X, QPSK-4096QAM, XPIC, ACM (EXR-700-001)	EXR-770-002	$3,784	65.00	$2,460	$1,324
5.014	DAC GE3 GIGABIT ETHERNET SWITCH CARD	EXD-181-002	$2,542	65.00	$1,652	$890
5.015	ECLIPSE, DAC 16XE1/DS1 V3, PROTECTABLE	EXD-161-002	$892	65.00	$580	$312
5.016	AUX, ALARM I/O CARD	EXA-001	$706	65.00	$459	$247
	CTR 8740					
5.017	CTR 8740 with Std Sync option, Fan Assembly, Blank cover plates, Install kit, DC power, incl SD card, Software and Base License	CTE-740-001	$7,563	60.00	$4,538	$3,025
5.018	SFP+ OPT 10Gbit 1310nm SMF LC 10km LR/LW -40 to 85C (LX4002IDR-AAN)	079-422678-001	$250	28.00	$70	$180
5.019	SFP OPT GIGE 1310nm SMF LC 10KM 0 to 70C	079-422656-001	$86	28.00	$24	$62
5.020	SFP Elec GIGE RJ45 100m CTR ONLY (with RX_LOS) 0 to 70C	083-845537-001	$129	28.00	$36	$93
5.021	CTR 8700 Series R3 MPLS Software License	CZL-67350	$5,446	60.00	$3,268	$2,178
5.022	CTR 8700 1588v2 PTP TRANSPARENT CLOCK (ONE LICENSE PER CHASSIS)	CZF-67100	$1,440	60.00	$864	$576
5.023	CTR 8700 SECURE MANAGEMENT NODAL LICENSE (ONE LICENSE PER CHASSIS)	CZF-67060	$2,001	60.00	$1,201	$800
5.024	CTR 8700 HIGH AVAILABILITY SWITCH / ROUTER WITH RADIO PROTECTION (ONE LICENSE PER CHASSIS)	CZF-67125	$2,118	60.00	$1,271	$847
5.025	Cable, QSFP-DD to QSFP-DD, Diversity cable, 1.0M (C45593-A571-D10)	037-579807-001	$501	28.00	$140	$361
5.026	DIRECT ATTACH STACKING CABLE, TWIN-AX, SFP+ TO SFP+, 10GBPS, 500mm	037-579820-005	$113	28.00	$32	$81
	Misc					
5.027	KIT, LIGHTNING ARRESTOR, UNIVERSAL, 50 OHM, MALE TO FEMALE	179-530062-002	$77	28.00	$22	$55

This sales quotation and any resulting Customer order ("Order") are subject to Aviat Networks standard terms and conditions of sale ("Conditions"), which are available at the following web site: http://www.aviatnetworks.com/media/files/AVWN_STCS.pdf. However, if an Order is issued under or in connection with an applicable master agreement between Aviat and Customer (an "Existing Agreement"), then the Existing Agreement will govern and control the Order.

ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
6.000	**WTM 4000 Radios, License, Cables**					
	 					
6.001	WTM 4100, L6 GHz (Planning Model only)	M-W41-L6	$14,110	63.00	$8,889	$5,221
6.002	WTM 4100, U6 GHz (Planning Model only)	M-W41-U6	$14,110	63.00	$8,889	$5,221
6.003	WTM 4100, 07 GHz (Planning Model only)	M-W41-07	$14,110	63.00	$8,889	$5,221
6.004	WTM 4100, 08 GHz (Planning Model only)	M-W41-08	$14,110	63.00	$8,889	$5,221
6.005	WTM 4100, 10 GHz (Planning Model only)	M-W41-10	$14,110	63.00	$8,889	$5,221
6.006	WTM 4100, 11 GHz (Planning Model only)	M-W41-11	$14,110	63.00	$8,889	$5,221
6.007	WTM 4100, 13 GHz (Planning Model only)	M-W41-13	$14,110	63.00	$8,889	$5,221
6.008	WTM 4100, 15 GHz (Planning Model only)	M-W41-15	$14,110	63.00	$8,889	$5,221
6.009	WTM 4100, 18 GHz (Planning Model only)	M-W41-18	$14,110	63.00	$8,889	$5,221
6.010	WTM 4100, 23 GHz (Planning Model only)	M-W41-23	$14,110	63.00	$8,889	$5,221
6.011	WTM 4200, L6 GHz (Planning Model only)	M-W42-L6	$24,413	63.00	$15,380	$9,033
6.012	WTM 4200, U6 GHz (Planning Model only)	M-W42-U6	$24,413	63.00	$15,380	$9,033
6.013	WTM 4200, 07 GHz (Planning Model only)	M-W42-07	$24,413	63.00	$15,380	$9,033
6.014	WTM 4200, 08 GHz (Planning Model only)	M-W42-08	$24,413	63.00	$15,380	$9,033
6.015	WTM 4200, 10 GHz (Planning Model only)	M-W42-10	$24,413	63.00	$15,380	$9,033
6.016	WTM 4200, 11 GHz (Planning Model only)	M-W42-11	$24,413	63.00	$15,380	$9,033
6.017	WTM 4200, 13 GHz (Planning Model only)	M-W42-13	$24,413	63.00	$15,380	$9,033
6.018	WTM 4200, 15 GHz (Planning Model only)	M-W42-15	$24,413	63.00	$15,380	$9,033
6.019	WTM 4200, 18 GHz (Planning Model only)	M-W42-18	$24,413	63.00	$15,380	$9,033
6.020	WTM 4200, 23 GHz (Planning Model only)	M-W42-23	$24,413	63.00	$15,380	$9,033
6.021	Remote Mount Bracket Assembly, WTM4100, WTM4200, WTM4500	179-530505-001	$892	30.00	$268	$624
6.022	WTM 4100/4200 ODU600v2 6 GHz Waveguide Transition Kit, WR 137 waveguide, UDR 70 flange	179-530500-006	$267	30.00	$80	$187
6.023	WTM 4100/4200 ODU600v2 7/8 GHz Waveguide Transition Kit, WR 112 waveguide, UDR 84 flange	179-530500-007	$304	30.00	$91	$213
6.024	WTM 4100/4200 ODU600v2 10/11 GHz Waveguide Transition Kit, WR 90 waveguide, UDR 100 flange	179-530500-011	$265	30.00	$80	$185
6.025	WTM4000 Base License, inc CLI & GUI, IPv4 or IPv6, VLANs, 10Mbps	WZL-BASE	$560	63.00	$353	$207
6.026	WTM4000 CE1 License, inc QoS, QinQ, Routed NMS, Traffic scheduling, Spanning Tree	WZL-CE1	$1,713	63.00	$1,079	$634
6.027	WTM4000 CE1 License, inc ERPS, HQoS, Ethernet EOAM 802.3ah 802.3ag	WZL-CE2	$2,867	63.00	$1,806	$1,061
6.028	WTM 4000 Radio Throughput License 50 Mbps	WZF-40050	$765	63.00	$482	$283
6.029	WTM 4000 Radio Throughput License 100 Mbps	WZF-40100	$1,446	63.00	$911	$535
6.030	WTM 4000 Radio Throughput License 500 Mbps	WZF-40500	$5,599	63.00	$3,527	$2,072
6.031	WTM 4000 Radio Throughput License 1000 Mbps	WZF-41000	$9,639	63.00	$6,073	$3,566
6.032	WTM 4000 Radio Throughput License 2500 Mbps	WZF-42500	$12,078	63.00	$7,609	$4,469
6.033	WTM 4000 Multi-Layer Header Compression (MLHC) License	WZF-MLHC	$1,066	63.00	$672	$394
6.034	WTM 4000 Adaptive Modulation License up to 1024 QAM	WZF-AM1	$1,008	63.00	$635	$373
6.035	WTM 4000 Adaptive Modulation License up to 4096 QAM	WZF-AM2	$1,344	63.00	$847	$497
6.036	WTM4200 2nd RFM Enable License	WZF-42SECRFM	$3,919	63.00	$2,469	$1,450
6.037	WTM4100 Adaptive Dual Carrier (A2C) Enable License	WZF-41A2C	$3,919	63.00	$2,469	$1,450
6.038	POE INJECTOR, 112W 100 to 240VAC, POWER CORD NOT INCLUDED, USE WITH ALL WTM 4000 (MIT-51G-56PNN)	045-310105-001	$730	30.00	$219	$511
6.039	POE INJECTOR, 112W 40 to 72VDC, POWER CORD NOT INCLUDED, USE WITH ALL WTM 4000 (MIT-65G-4856)	045-310107-001	$831	30.00	$249	$582
6.040	OUTDOOR IP66 POE INJECTOR, 112W 100 to 240VAC, INC SURGE ARRESTORS, POWER CORD NOT INCLUDED, USE WITH ALL WTM 4000 (MIT-51G-56PNN-IP66-T105G)	045-310108-001	$525	30.00	$158	$367
6.041	OUTDOOR IP66 POE INJECTOR, 112W 40 to 72VDC, INC SURGE ARRESTORS, POWER CORD NOT INCLUDED, USE WITH ALL WTM 4000 (MIT-65G-4856-IP66-T105G)	045-310109-001	$547	30.00	$164	$383
6.042	Power Cord, IEC 60320-C13 to NORTH AMERICA PLUG, 2-2.5m (6.5-8') (17250 10 B1)	2940-04-00-01	$34	30.00	$10	$24
6.043	WiFi Dongle, USB-powered (07W8938)	009-320006-001	$202	30.00	$61	$141
6.044	CABLE, PWR 2 CORE BLUE/GREY, 2x16AWG, 10M UNTERM (FRHT1300292-10)	037-579712-010	$78	30.00	$23	$55
6.045	CABLE, PWR 2 CORE BLUE/GREY, 2x16AWG, 50M UNTERM (FRHT1300292-50)	037-579712-050	$389	30.00	$117	$272
6.046	CABLE, PWR 2 CORE BLUE/GREY, 2x16AWG, 100M UNTERM (FRHT1300292-100)	037-579712-100	$778	30.00	$233	$545
6.047	CABLE, PWR 2 CORE BLUE/GREY, 2x16AWG, 500M REEL (FRHT1300292-500)	037-579712-500	$3,889	30.00	$1,167	$2,722
6.048	CONN, TERMINAL BLOCK, RECEPTACLE, 6 PIN, DUAL ROW, 3.5MM PITCH, CABLE MOUNT (1790302)	034-392398-001	$17	30.00	$5	$12
6.049	CABLE KIT, ETHERNET, CAT 5E, SHIELDED, 24 AWG, INDOOR/OUTDOOR, INCLUDES 2x RJ45 (M)	037-579711-050	$148	30.00	$44	$104
6.050	CABLE KIT, ETHERNET, CAT 5E, SHIELDED, 24 AWG, INDOOR/OUTDOOR, INCLUDES 2x RJ45 (M)	037-579711-100	$295	30.00	$89	$206
6.051	CABLE, CAT 5E, 24AWG, 500M UNTERM REEL (HGTD-CAT5E)	037-579711-500	$785	30.00	$236	$549
6.052	CONN PG SHLD RJ-45 8P8C (TA5708FS)	039-020096-721	$1	30.00		$1
6.053	CRIMP TOOL, RJ45 EDGE ODU CABLE (TA5808A)	008-311001-001	$50	30.00	$15	$35
6.054	CABLE TIE, 450 MM (17.7") LENGTH, 4.8 MM WIDTH, NYLON, BLACK, (KIT, 50 PIECES) (40417)	006-371750-000	$9	30.00	$3	$6
6.055	CABLE, FIBRE OPTICS, OUTDOOR, SMF, 2xLC to 2xLC, 10M (037-579710-010 R004)	037-579723-010	$89	30.00	$27	$62
6.056	CABLE, FIBRE OPTICS, OUTDOOR, SMF, 2xLC to 2xLC, 50M (037-579710-050 R004)	037-579723-050	$281	30.00	$84	$197
6.057	CABLE, FIBRE OPTICS, OUTDOOR, SMF, 2xLC to 2xLC, 100M (037-579710-100 R004)	037-579723-100	$481	30.00	$144	$337
6.058	CABLE, FIBRE OPTICS, OUTDOOR, SMF, 2xLC to 2xLC, 300M (037-579710-300 R004)	037-579723-300	$1,272	30.00	$382	$890
6.059	CABLE, FIBRE OPTICS, OUTDOOR, SMF, 2xLC to 2xLC, 500M (037-579710-500 R004)	037-579723-500	$2,065	30.00	$620	$1,445
6.060	WTM 4000 POE CABLE, CAT 6, 22AWG, 50M PRE-TERMINATED WITH RJ-45, GLAND PRE-FITTED (C45593-A567-A050)	037-579724-050	$351	30.00	$105	$246
6.061	WTM 4000 POE CABLE, CAT 6, 22AWG, 75M PRE-TERMINATED WITH RJ-45, GLAND PRE-FITTED (C45593-A567-A075)	037-579724-075	$504	30.00	$151	$353
6.062	WTM 4000 POE CABLE, CAT 6, 22AWG, 100M PRE-TERMINATED WITH RJ-45, GLAND PRE-FITTED (C45593-A567-A100)	037-579724-100	$475	30.00	$143	$332
6.063	GIG ETH SFP, OPT SMF 1310nm LC 1000BASE-LX, <10 KM (LS38-C3S-TC-N)	079-422656-001	$86	30.00	$26	$60
6.064	GIG ETH SFP, OPT SMF 1550nm LC 1000BASE-ZX, <70KM (LS48-C3U-TC-N)	079-422665-001	$599	30.00	$180	$419
6.065	SFP+ OPT TRANSCEIVER, DUAL RATE 1G-10G ETHERNET, 1310nm, 10KM SM (FTLX1471D3BCV)	079-422668-001	$709	30.00	$213	$496
7.000	**ProVision EMS - Software, ProVision PLUS**					
7.001	ProVision Solution Pack - 10 Nodes	614-225008-002	$5,648	50.00	$2,824	$2,824
7.002	PROVISION SOLUTION PACK - 50 NODES	614-225061-002	$23,722	50.00	$11,861	$11,861
7.003	PROVISION SOLUTION PACK - 100 NODES	614-225012-002	$45,184	50.00	$22,592	$22,592
7.004	PROVISION SOLUTION PACK - 250 NODES	614-225063-002	$67,776	50.00	$33,888	$33,888
7.005	PROVISION SOLUTION PACK - 500 NODES	614-225014-002	$90,368	50.00	$45,184	$45,184
7.006	STANDBY SERVER - PV SOLUTION PACK - 100 NODES	614-625012-001	$5,648	50.00	$2,824	$2,824
7.007	STANDBY SERVER - PV SOLUTION PACK - 500 NODES	614-625014-001	$16,944	50.00	$8,472	$8,472
7.008	ProVision Plus EM Fault & Performance Module Technology License	276-101001-001	$33,888	50.00	$16,944	$16,944
7.009	ProVision Plus EM Fault & Performance Module WTM 4000 Device License (10 pack)	276-101002-001	$3,954	50.00	$1,977	$1,977
7.010	ProVision Plus EM Fault & Performance Module WTM 4000 Device License	276-101022-001	$395	50.00	$198	$197

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ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
7.011	ProVision Plus EM Fault & Performance Module CTR 8740 Device License	276-101022-002	$514	50.00	$257	$257
7.012	ProVision Plus EM Provisioning Module Technology License	276-102001-001	$33,888	50.00	$16,944	$16,944
7.013	ProVision Plus EM Provisioning Module WTM 4000 Device License	276-102022-001	$395	50.00	$198	$197
7.014	ProVision Plus EM Provisioning Module CTR 8740 Device License	276-102022-002	$791	50.00	$396	$395
7.015	ProVision Plus EM Integration for ProVision Module Technology License	276-111001-001	$56,480	50.00	$28,240	$28,240
7.016	ProVision Plus IP/MPLS Fault & Performance Module Technology License	276-201001-001	$45,184	50.00	$22,592	$22,592
7.017	ProVision Plus IP/MPLS Fault & Performance Module CTR 8540 Device License (10 pack)	276-201002-001	$9,037	50.00	$4,519	$4,518
7.018	ProVision Plus IP/MPLS Fault & Performance Module CTR 8740 Device License	276-201022-002	$904	50.00	$452	$452
7.019	ProVision Plus IP/MPLS Fault & Performance Module CTR 8540 Device License	276-201022-003	$904	50.00	$452	$452
7.020	ProVision Plus Carrier Ethernet Fault & Performance Module Technology License	276-301001-001	$16,944	50.00	$8,472	$8,472
7.021	ProVision Plus Carrier Ethernet Fault & Performance Module WTM 4000 Device License (10 pack)	276-301002-001	$1,694	50.00	$847	$847
7.022	ProVision Plus Carrier Ethernet Fault & Performance Module WTM 4000 Device License	276-301022-001	$169	50.00	$85	$84
7.023	ProVision Plus Carrier Ethernet Fault & Performance Module CTR 8740 Device License	276-301022-002	$220	50.00	$110	$110
7.024	ProVision Plus EM & CE Fault & Performance Technology License Bundle	276-801001-001	$33,888	50.00	$16,944	$16,944
7.025	ProVision Plus EM & CE Fault & Performance Technology License Upgrade Bundle	276-801001-002	$90,368	50.00	$45,184	$45,184
7.026	ProVision Plus EM & CE & IP/MPLS Fault & Performance Technology License Bundle	276-801002-001	$79,072	50.00	$39,536	$39,536
7.027	ProVision Plus EM & CE Fault & Performance + EM Provisioning Technology License Bundle	276-801003-001	$67,776	50.00	$33,888	$33,888
7.028	ProVision Plus EM & CE Fault & Performance WTM 4000 Device License Bundle	276-802001-001	$407	50.00	$204	$203
7.029	ProVision Plus EM & CE Fault & Performance CTR 8740 Device License Bundle	276-802001-002	$537	50.00	$269	$268
7.030	ProVision Plus EM & CE Fault & Performance + EM Provisioning WTM 4000 Device License Bundle	276-802003-001	$802	50.00	$401	$401
7.031	ProVision Plus EM & CE Fault & Performance + EM Provisioning CTR 8740 Device License Bundle	276-802003-002	$1,327	50.00	$664	$663
7.032	ProVision Plus NBI Module Technology License	276-901001-001	$338,881	50.00	$169,441	$169,440
7.033	ProVision Plus High Availability Module Technology License	276-902001-001	$338,881	50.00	$169,441	$169,440
7.034	ProVision Plus NBI Lite Module Technology License	276-903001-001	$33,888	50.00	$16,944	$16,944
8.000	**ProVision EMS - Hardware**					
8.001	ProVision Windows Server, up to 1,000 SLV, Entry Level, Tower	614-100140-001	$5,196	30.00	$1,559	$3,637
8.002	ProVision Windows Server, up to 3,000 SLV, Mid Level, Tower	614-100141-001	$6,326	30.00	$1,898	$4,428
8.003	PROVISION WINDOWS SERVER, UP TO 9,000 SLV, HIGH LEVEL, TOWER	614-100142-001	$10,844	30.00	$3,253	$7,591
8.004	ProVision Windows Server, up to 1,000 SLV, Entry Level, Rack Mounted	614-100145-001	$6,326	30.00	$1,898	$4,428
8.005	ProVision Windows Server, up to 3,000 SLV, Mid Level, Rack Mounted	614-100150-002	$10,703	30.00	$3,211	$7,492
8.006	ProVision Windows Server, up to 9,000 SLV, High Level, Rack Mounted	614-100155-001	$10,392	30.00	$3,118	$7,274
8.007	ProVision Plus Windows Server, High Level, Rack Mounted	614-100161-001	$14,557	30.00	$4,367	$10,190
8.008	ProVision Windows Client Laptop up to 6,000 SLV, High Level	614-100165-001	$3,389	30.00	$1,017	$2,372
8.009	ProVision Windows Client Laptop up to 3,500 SLV, Entry Level	614-100170-001	$2,146	30.00	$644	$1,502
8.010	19" LCD MONITOR OPTION	614-100135-001	$1,581	30.00	$474	$1,107
8.011	24" MONITOR OPTION	614-100136-001	$700	30.00	$210	$490
8.012	KVM CONSOLE, CONSISTS OF KEYBOARD, 19" LCD MONITOR, 8-PORT SWITCH, IP REMOTE ACCESS, 4-POST RACK MOUNT (OPTIONAL MOUNTING BRACKET 614-100137-002 TO MOUNT ON 2-POST RACK), 19", 1 RU, 120-240 VAC INPUT, 50/60 HZ, C13 TO 5-15P POWER CORD (B020-U08-19-IP)	614-100137-001	$6,018	30.00	$1,805	$4,213
8.013	MOUNTING BRACKET, 2-POST RACK MOUNT BRACKET FOR 614-100137-001 KVM CONSOLE (B019-000)	614-100137-002	$182	30.00	$55	$127
9.000	**RAS service**					
	FAS (CAPEX)					
9.001	FAS Software & Support, per link (5 Years)	FAS-CAPEX	$6,750	25.00	$1,688	$5,062
9.002	FAS Software & Support, per link (10 Years)	FAS-CAPEX	$8,085	25.00	$2,021	$6,064
	ULS Professional Services					
9.003	ULS - Site Audits, Interference Analysis, PCN Updates & FCC License Modification, per link single channel (Public Safety)	ULS-PS	$4,133	25.00	$1,033	$3,100
9.004	ULS - Site Audits, Interference Analysis, PCN Updates & FCC License Modification, per link single channel (Other)	ULS-OT	$5,333	25.00	$1,333	$4,000
9.005	ULS Services - Number of hops with more than 1 RF channel	ULS-ADDCH	$1,540	25.00	$385	$1,155
	FAS (Annual / OPEX)					
9.006	FAS Software & Support, per link (1 Year)	FAS-OPEX	$1,250	25.00	$313	$937
9.007	FAS Software & Support, per link (1 Year)	FAS-OPEX	$1,250	25.00	$313	$937
10.000	**Direct Mount Antennas**					
10.001	ANTENNA, L6/U6 GHZ, 1.8 M (6FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101B1/B2, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP6-6W-GT1A)	AND-VHLP6-6W-GT1	$4,160	28.00	$1,165	$2,995
10.002	ANTENNA, L6/U6 GHZ, 1.8 M (6FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101B1/B2, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP6-6W-GT2)	AND-VHLP6-6W-GT2	$4,142	28.00	$1,160	$2,982
10.003	ANTENNA, L6/U6 GHZ, 1.2 M (4FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR, 250 KMPH, 200 KMPH (VHLP4-6W-GT1A)	AND-VHLP4-6W-GT1	$2,137	28.00	$598	$1,539
10.004	ANTENNA, L6/U6 GHZ, 1.2 M (4FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR, 250 KMPH, 200 KMPH (VHLP4-6W-GT2)	AND-VHLP4-6W-GT2	$2,119	28.00	$593	$1,526
10.005	ANTENNA, L6/U6 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP3-6W-GT1A)	AND-VHLP3-6W-GT1	$1,628	28.00	$456	$1,172
10.006	ANTENNA, L6/U6 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP3-6W-GT2)	AND-VHLP3-6W-GT2	$1,610	28.00	$451	$1,159
10.007	ANTENNA, 10/11 GHZ , 1.2 M (4FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 200 KMPH (VHLP4-11W-GT1A)	AND-VHLP4-11W-GT1	$1,957	28.00	$548	$1,409
10.008	ANTENNA, 10/11 GHZ , 1.2 M (4FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 200 KMPH (VHLP4-11W-GT2)	AND-VHLP4-11W-GT2	$1,939	28.00	$543	$1,396
10.009	ANTENNA, 10/11 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A/B, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP3-11W-GT1A)	AND-VHLP3-11W-GT1	$1,497	28.00	$419	$1,078
10.010	ANTENNA, 10/11 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A/B, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP3-11W-GT2)	AND-VHLP3-11W-GT2	$1,479	28.00	$414	$1,065
10.011	ANTENNA, 10/11 GHZ , 0.6 M (2FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101B, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP2-11W-GT1A)	AND-VHLP2-11W-GT1	$646	28.00	$181	$465

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ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
10.012	ANTENNA, 10/11 GHZ , 0.6 M (2FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101B, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP2-11W-GT2)	AND-VHLP2-11W-GT2	$614	28.00	$172	$442
10.013	ANTENNA, 18 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP3-18-GT1A)	AND-VHLP3-18-GT1	$1,497	28.00	$419	$1,078
10.014	ANTENNA, 18 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP3-18-GT2)	AND-VHLP3-18-GT2	$1,479	28.00	$414	$1,065
10.015	ANTENNA, 18 GHZ, 0.6 M (2FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP2-18-GT1A)	AND-VHLP2-18-GT1	$600	28.00	$168	$432
10.016	ANTENNA, 18 GHZ, 0.6 M (2FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP2-18-GT2)	AND-VHLP2-18-GT2	$584	28.00	$164	$420
10.017	ANTENNA, 18 GHZ, 0.3 M (1FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP1-18-GT1A)	AND-VHLP1-18-GT1	$507	28.00	$142	$365
10.018	ANTENNA, 18 GHZ, 0.3 M (1FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP1-18-GT2)	AND-VHLP1-18-GT2	$491	28.00	$137	$354
10.019	ANTENNA, 23 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 21.2-23.6 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP3-23-GT1A)	AND-VHLP3-23-GT1	$1,497	28.00	$419	$1,078
10.020	ANTENNA, 23 GHZ, 1.0 M (3FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 21.2-23.6 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP3-23-GT2)	AND-VHLP3-23-GT2	$1,479	28.00	$414	$1,065
10.021	ANTENNA, 23 GHZ, 0.6 M (2FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 21.2-23.6 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP2-23-GT1A)	AND-VHLP2-23-GT1	$600	28.00	$168	$432
10.022	ANTENNA, 23 GHZ, 0.6 M (2FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 21.2-23.6 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP2-23-GT2)	AND-VHLP2-23-GT2	$569	28.00	$159	$410
10.023	ANTENNA, 23 GHZ, 0.3 M (1FT), VALULINE, HPLP (GT1- RECTANGULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 21.2-23.6 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP1-23-GT1A)	AND-VHLP1-23-GT1	$507	28.00	$142	$365
10.024	ANTENNA, 23 GHZ, 0.3 M (1FT), VALULINE, HPLP (GT2- CIRCULAR INTERFACE), DIRECT MOUNT, DISH (STD: WHITE), 21.2-23.6 GHZ, RADOME (STD: GRAY), DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (VHLP1-23-GT2)	AND-VHLP1-23-GT2	$491	28.00	$137	$354
11.000	**Remote Mount Antennas**					
11.001	ANTENNA, L6 GHZ, 3.7 M (12FT), TRUNKLINE, HP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-6.425 GHZ, RADOME (STD: WHITE), CPR137G SINGLE POL., CLASS II/FCC101A, TWO PIECE REFLECTOR. 200 KMPH. 190 KMPH (DA12-59AC)	RFS-DA12-59XC	$20,442	28.00	$5,724	$14,718
11.002	ANTENNA, L6/U6 GHZ, 3.7 M (12FT), VALULINE, HP, HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS III/FCC101A, TWO PIECE REFLECTOR. 200 KMPH. 180 KMPH (HX12-6W-6GR)	AND-HX12-6W-6GR	$18,167	28.00	$5,087	$13,080
11.003	ANTENNA, L6/U6 GHZ, 3.7 M (12FT), SENTINEL, UHP, SUPER HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS 4/FCC101A, TWO PIECE REFLECTOR. 200 KMPH. 180 KMPH (USX12-6W-6GR)	AND-USX12-6W-6GR	$17,719	28.00	$4,961	$12,758
11.004	ANTENNA, L6/U6 GHZ, 3.0 M (10FT), VALULINE, HP, HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS III/FCC101A, TWO PIECE REFLECTOR. 200 KMPH. 180 KMPH (HX10-6W-6GR)	AND-HX10-6W-6GR	$12,951	28.00	$3,626	$9,325
11.005	ANTENNA, L6 GHZ, 3.0 M (10FT), TRUNKLINE, HP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-6.425 GHZ, RADOME (STD: WHITE), CPR137G SINGLE POL., CLASS II/FCC101A, SINGLE PIECE REFLECTOR. 200 KMPH. 190 KMPH (DA10-59AC)	RFS-DA10-59XC	$13,423	28.00	$3,758	$9,665
11.006	ANTENNA, L6/U6 GHZ, 3.0 M (10FT), SENTINEL, UHP, SUPER HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS 3/FCC101A, TWO PIECE REFLECTOR. 200 KMPH. 180 KMPH (USX10-6W-6GR)	AND-USX10-6W-6GR	$13,692	28.00	$3,834	$9,858
11.007	ANTENNA, L6/U6 GHZ, 2.4M (8FT), VALULINE, HP, HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 200 KMPH. 180 KMPH (HX8-6W-6GR)	AND-HX8-6W-6GR	$8,054	28.00	$2,255	$5,799
11.008	ANTENNA, L6 GHZ, 2.4 M (8FT), TRUNKLINE, HP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-6.425 GHZ, RADOME (STD: WHITE), CPR137G SINGLE POL., CLASS II/FCC101A, SINGLE PIECE REFLECTOR. 200 KMPH. 190 KMPH	RFS-DA8-59XC	$10,866	28.00	$3,042	$7,824
11.009	ANTENNA, L6/U6 GHZ, 2.4M (8FT), SENTINEL, UHP, SUPER HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS IV/FCC101A, SINGLE PIECE REFLECTOR. 200 KMPH. 180 KMPH (USX8-6W-6GR)	AND-USX8-6W-6GR	$9,343	28.00	$2,616	$6,727
11.010	ANTENNA, L6/U6 GHZ, 1.8 M (6FT), SENTINEL, UHP, SUPER HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 5.925-7.125, RADOME (STD: GRAY), CPR137G, DUAL POL., CLASS IV/FCC101A, SINGLE PIECE REFLECTOR. 200 KMPH. 180 KMPH (USX6-6W-6GR)	AND-USX6-6W-6GR	$6,887	28.00	$1,928	$4,959
11.011	ANTENNA, L6/U6 GHZ, 1.8 M (6FT), COMPACTLINE, UHP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: WHITE), CPR137G SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 200 KMPH. 200 KMPH	RFS-SB6-W60XC	$5,740	28.00	$1,607	$4,133
11.012	ANTENNA, L6/U6 GHZ, 1.8 M (6FT), VALULINE, HPLP, REMOTE MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY) WITHOUT FLASH, CPR137G SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR. 250 KMPH/180 KMPH	AND-VHLP6-6W-6WH	$3,968	28.00	$1,111	$2,857
11.013	ANTENNA, L6/U6 GHZ, 1.2 M (4FT), VALULINE, HPLP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), CPR137G, SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR. 200 KMPH. 250 KMPH	AND-VHLP4-6W-6WH/C	$2,798	28.00	$783	$2,015
11.014	ANTENNA, L6/U6 GHZ, 1.2 M (4FT), COMPACTLINE, UHP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: WHITE), CPR137G SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR. 200 KMPH. 200 KMPH (SB4-W60DC)	RFS-SB4-W60XC	$2,082	28.00	$583	$1,499
11.015	ANTENNA, L6/U6 GHZ, 1.2 M (4FT), SENTINEL, HP, REMOTE MOUNT, DISH (STD: WHITE), 5.925 - 7.125 GHZ, RADOME (STD: WHITE), CPR137G, DUAL POL., CLASS III, FCC PART 101B2, SINGLE PIECE REFLECTOR. 200 KMPH OPERATIONAL. 250 KMPH SURVIVAL (SHPX4-6W-6WH)	AND-SHPX4-6W-6WH	$4,104	28.00	$1,149	$2,955
11.016	ANTENNA, L6/U6 GHZ, 1.0 M (3FT), VALULINE, HPLP, REMOTE MOUNT, DISH (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: GRAY), CPR137G, SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH	AND-VHLP3-6W-6WH	$2,053	28.00	$575	$1,478
11.017	ANTENNA, L6/U6 GHZ, 0.9 M (3FT), COMPACTLINEEASY, UHP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 5.925-7.125 GHZ, RADOME (STD: WHITE), CPR137G SINGLE POL., CLASS III/FCC101B2, SINGLE PIECE REFLECTOR. 250 KMPH. 180 KMPH (SC3-W60AC)	RFS-SC3-W60XC	$1,597	28.00	$447	$1,150

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ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
11.018	ANTENNA, L6/U6 GHz, 1.0 M (3FT), SENTINEL, HP, REMOTE MOUNT, DISH (STD: WHITE), 5.925-7.125 GHz, RADOME (STD: GRAY), PDR70, DUAL POLE, SINGLE PIECE REFLECTOR, CLASS III/FCC PART 101B2, 250 KMPH, 200 KMPH (SHPX3-6W-4WH/A)	AND-SHPX3-6W-4WH	$1,858	28.00	$520	$1,338
11.019	ANTENNA, 10/11 GHZ, 1.8 M (6FT), VALULINE, HPLP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 10.0-11.7 GHZ, RADOME (STD: GRAY), SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH	AND-VHLP6-11W-6WH	$5,768	28.00	$1,615	$4,153
11.020	ANTENNA, 10/11 GHZ, 1.8 M (6FT), VALULINE, HP, HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 10.0-11.7, RADOME (STD: GRAY), CPR090G, DUAL POL., CLASS III/FCC105A/107A, SINGLE PIECE REFLECTOR, 200 KMPH, 180 KMPH (HX6-11W-6GR)	AND-HX6-11W-6GR	$5,154	28.00	$1,443	$3,711
11.021	ANTENNA, 10/11 GHZ, 1.8 M (6FT), SENTINEL, UHP, SUPER HIGH XPD, REMOTE MOUNT, DISH (STD: GRAY), 10.0-11.7, RADOME (STD: GRAY), CPR090G, DUAL POL., CLASS IV/FCC105A/107A, SINGLE PIECE REFLECTOR, 200 KMPH, 180 KMPH (USX6-11W-6GR)	AND-USX6-11W-6GR	$6,887	28.00	$1,928	$4,959
11.022	ANTENNA, 10/11 GHZ, 1.8 M (6FT), COMPACTLINE, UHP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 10.000-11.700 GHZ, RADOME (STD: WHITE), CPR90G SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 200 KMPH, 200 KMPH	RFS-SB6-W100XC	$5,235	28.00	$1,466	$3,769
11.023	ANTENNA, 10/11 GHZ, 1.2 M (4FT), COMPACTLINE, UHP, HIGH GAIN, REMOTE MOUNT, PARABOLIC (STD: WHITE), 10.000-11.700 GHZ, RADOME (STD: WHITE), CPR90G SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 200 KMPH, 200 KMPH (SB4-W100DC-HG)	RFS-SB4-W100XC-HG	$2,082	28.00	$583	$1,499
11.024	ANTENNA, 10/11 GHZ, 1.2 M (4FT), VALULINE, HPLP REMOTE MOUNT, DISH (STD: WHITE), 10.125-11.700 GHZ, RADOME (STD:GRAY), CPR90G SINGLE POLARIZED, CLASS III/FCC101A/B, SINGLE PIECE REFLECTOR, 250 KMPH (SURVIVAL), 200 KMPH (OPERATIONAL)	AND-VHLP4-11W-6WH	$2,049	28.00	$574	$1,475
11.025	ANTENNA, 10/11 GHz, 1.2M (4ft), SENTINEL, HP, REMOTE MOUNT, DISH (STD: WHITE), 10.125 - 11.700 GHz, RADOME (STD: GRAY), DUAL POL., Class III+/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 200 KMPH (SHPX4-11W-6WH)	AND-SHPX4-11W-6WH	$4,017	28.00	$1,125	$2,892
11.026	ANTENNA, 10/11 GHZ, 1.0 M (3FT), VALULINE, HPLP, REMOTE MOUNT, DISH (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), CPR90G, SINGLE POL., CLASS III/FCC101A/B, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH	AND-VHLP3-11W-6WH	$1,620	28.00	$454	$1,166
11.027	ANTENNA, 10/11 GHz, 1.0M (3ft), SENTINEL, HP, REMOTE MOUNT, DISH (STD: WHITE), 10.125 - 11.700 GHz, RADOME (STD: GRAY), DUAL POL., Class III+/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 200 KMPH (SHPX3-11W-6WH/A)	AND-SHPX3-11W-6WH	$2,124	28.00	$595	$1,529
11.028	ANTENNA,10/11 GHZ,0.9 M (3FT),COMPACTLINEEASY, UHP,REMOTE MOUNT,PARABOLIC (STD: WHITE),10.000-11.700 GHZ,RADOME (STD: WHITE),CPR90G,SINGLE POLARIZED,CLASS III/FCC101A,180 KMPH,SINGLE PIECE REFLECTOR	RFS-SC3-W100AC	$1,406	28.00	$394	$1,012
11.029	ANTENNA, 10/11 GHZ, 0.6 M (2FT), COMPACTLINEEASY, UHP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 10.000-11.700 GHZ, RADOME (STD: WHITE), CPR90G SINGLE POL., CLASS III/FCC101A/B, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH	RFS-SC2-W100XC	$1,060	28.00	$297	$763
11.030	ANTENNA, 10/11 GHZ, 0.6 M (2FT), VALULINE, HPLP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 10.125-11.7 GHZ, RADOME (STD: GRAY), CPR90G, SINGLE POL., CLASS III/FCC101A/B, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH	AND-VHLP2-11W-6WH	$568	28.00	$159	$409
11.031	ANTENNA, 18 GHZ, 0.9 M (3FT), COMPACTLINEEASY, UHP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 17.700-19.700 GHZ, RADOME (STD: WHITE), PBR220, SINGLE POLARIZED, CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 160 KMPH (SC3-190BB)	RFS-SC3-190XB	$1,287	28.00	$360	$927
11.032	ANTENNA,18 GHZ,0.6 M (2FT),COMPACTLINEEASY, UHP,REMOTE MOUNT,PARABOLIC (STD: WHITE),17.700-19.700 GHZ,RADOME (STD: WHITE),PBR220,SINGLE POLARIZED,CLASS III/FCC101A,180 KMPH,SINGLE PIECE REFLECTOR	RFS-SC2-190BB	$859	28.00	$241	$618
11.033	ANTENNA, 18 GHZ, 0.6 M (2FT), VALULINE, HPLP, REMOTE MOUNT, PARABOLIC (STD: WHITE), 17.7-19.7 GHZ, RADOME (STD: GRAY), UG-595, SINGLE POL., CLASS III/FCC101A, SINGLE PIECE REFLECTOR, 250 KMPH, 180 KMPH (VHLP2-18-1WH/C)	AND-VHLP2-18-1WH	$691	28.00	$193	$498
12.000	**IF Cables & Accessories**					
12.001	CABLE, ODU, 9913, WITH CONN/GROUND KIT, 50M CNT400 CCAL TYPE (STXC400-GKWT-50)	037-579311-050	$248	28.00	$69	$179
12.002	CABLE, ODU, 9913, WITH CONN/GROUND KIT, 75M CNT400 CCAL TYPE (STXC400-GKWT-75)	037-579311-075	$597	28.00	$167	$430
12.003	CABLE, ODU, 9913, WITH CONN/GROUND KIT, 150M CNT400 CCAL TYPE (STXC400-GKWT-150)	037-579311-150	$830	28.00	$232	$598
12.004	CONNECTOR KIT N TYPE M&F 400 TYPE CABLE (N0121A1-002-NT3G-50)	179-530057-001	$34	28.00	$10	$24
12.005	LIGHTNING ARRESTOR KIT, UNIVERSAL, 50 OHM, TYPE N, MALE TO FEMALE (108-1118B-A-KIT)	179-530062-002	$77	28.00	$22	$55
12.006	WEATHERPROOFING KIT (HF-TAPEKIT)	011-390001-001	$4	28.00	$1	$3
12.007	HOISTING GRIP, FOR 3/8 INCH COAXIAL CABLE (L2SGRIP)	AND-L2SGRIP	$42	28.00	$12	$30
12.008	ADAPTER, ANGLE, SS, FOR MINI CLICK-ON HANGAERS (10/PK) (294572)	179-530160-005	$69	28.00	$19	$50
12.009	MINIATURE CLICK-ON HANGER FOR 9-12 MM (BHD-38)	179-530160-007	$19	28.00	$5	$14
12.010	HARDWARE, SNGL STACK, SS, FOR MINI CLICK -ON HANGERS (10/PK) (252027-10KT-P)	AND-252027-10KT-P	$53	28.00	$15	$38
12.011	HARDWARE KIT FOR 1/2 IN OR 7/8 IN DOUBLE CLICK ON HANGERS, INCL 3/8 IN BOLTS AND	179-530160-006	$40	28.00	$11	$29
12.012	TRIPLE STACK H/W KIT FOR MINI CLICK-ON HANGERS, INCL M8 BOLTS & H/W (252029-10KT-P)	AND-252029-10KT-P	$59	28.00	$17	$42
12.013	THREAD ROD SUPPORT 12IN (305MM) LONG, KIT OF 5 (31771-4)	AND-31771-4	$42	28.00	$12	$30
12.014	CABLE BOOT ASSY FOR 3/8 IN COR COAX CBL, 6 HOLES (SEC-638)	AND-SEC-638	$92	28.00	$26	$66
12.015	ENTRANCE PANEL, FEED-THRU ENTRY PANEL, 4-PORT, 1X4, PORT SIZE 4", ENTRY CAP INCLUDED, ALUMINUM (204673-4)	220-000044-001	$83	28.00	$23	$60
13.000	**Waveguide & Accessories**					
13.001	HARDWARE-KIT (ONE KIT PER 100FT)	179-530526-001	$769	28.00	$215	$554
13.002	ELLIPTICAL WAVEGUIDE STANDARD, 5.925-7.125 GHZ, BLACK PE JACKET, PER FOOT (EW63-F)	AND-EW63-F	$12	28.00	$3	$9
13.003	EW63INSTALL-KIT (ONE KIT PER WAVEGUIDE RUN) (EW63INSTALL-KIT)	AND-EW63INSTALL-KIT	$1,586	28.00	$444	$1,142
13.004	WAVEGUIDE CUSHION HANGER, KITS, EW63, 2-HOLE (BAG OF 5 KITS)	018-510063-002	$93	28.00	$26	$67
13.005	ENTRY BOOT, KIT, FOR EW63, 4", 2-HOLE (BAEW632)	VLT-BAEW632	$63	28.00	$18	$45
13.006	ELLIPTICAL WAVEGUIDE STANDARD, 10.2-11.7 GHZ, BLACK PE JACKET, PER FOOT (EW90-F)	AND-EW90-F	$11	28.00	$3	$8
13.007	EW90INSTALL-KIT (ONE KIT PER WAVEGUIDE RUN) (EW90INSTALL-KIT)	AND-EW90INSTALL-KIT	$1,574	28.00	$441	$1,133
13.008	WAVEGUIDE CUSHION HANGER, KITS, EW90, 3-HOLE (BAG OF 5 KITS)	018-510090-003	$89	28.00	$25	$64
13.009	ENTRY BOOT, KIT, FOR EW90 AND EWP90, 4", 3-HOLE (BAEW903)	VLT-BAEW903	$63	28.00	$18	$45
13.010	ENTRANCE PANEL, 2 PORT, 1 X 2 IN (204673-2A)	AND-204673-2A	$121	28.00	$34	$87
13.011	ENTRANCE PANEL, 3 PORT, 1X3 IN (204673-3)	AND-204673-3	$160	28.00	$45	$115
14.000	**Dehydrators**					
14.001	DEHYDRATOR, AUTOMATIC, LAB4.50, 10-60 KPA, 300 L/H, 120 VAC 50/60 HZ INPUT, 6 AIR OUTLETS 3/8", ETHERNET. INCLUDES SIX HOSE FITTING ADAPTER STRAIGHT + SIX 90 DEGREE ELBOW + 40M HOSE. MOUNTING: WALL, FLOOR AND RACK. 19"W, 5.2"H (3RU), 13.2"D (C15130.602)	CIB-C15130.602	$6,071	28.00	$1,700	$4,371
14.002	MANIFOLD, 1 PORT INLET, 4 PORTS OUTLET AND SHUT OFF VALVES, 3/8" PUSH-ON FITTING (K15019-005)	CIB-K15019-005	$414	28.00	$116	$298
15.000	**Factory services**					
15.001	ODU/INU Level 2 Terminal Assy & RF Link Test Service	VAS-ODUINU-002	$181	10.00	$18	$163
15.002	IRU600 Level 3, Standard Integration Service	VAS-IRU000-003	$778	10.00	$78	$700
15.003	IRU600 Level 3, Advanced Custom Configuration	VAS-IRU000-AC3	$337	10.00	$34	$303
15.004	IRU600 Level 3, Extended Long Count BER	VAS-IRU000-LC3	$156	10.00	$16	$140

This sales quotation and any resulting Customer order ("Order") are subject to Aviat Networks standard terms and conditions of sale ("Conditions"), which are available at the following web site: http://www.aviatnetworks.com/media/files/AVWN_STCS.pdf. However, if an Order is issued under or in connection with an applicable master agreement between Aviat and Customer (an "Existing Agreement"), then the Existing Agreement will govern and control the Order.

ITEM	EQUIPMENT LIST DESCRIPTION	PRODUCT CODE PART NUMBER	UNIT LIST PRICE PRICE	Discount Pct	 Amt	Unit Price
15.005	ODU Level 3, Standard Integration Service	VAS-ODU000-003	$518	10.00	$52	$466
15.006	ODU Level 3, Advanced Custom Configuration	VAS-ODU000-AC3	$337	10.00	$34	$303
15.007	ODU Level 3, Extended Long Count BER	VAS-ODU000-LC3	$156	10.00	$16	$140
15.008	WTM PRELOAD SERVICE	VAS-WTM4000-00A	$52	10.00	$5	$47
16.000	**Warranty**					
16.001	WARRANTY PLUS IW - WORLD WIDE, 24 MONTHS, ODU 600	SWW-BWXXA1002443	$365	20.00	$73	$292
16.002	WARRANTY PLUS IW - NA&C, 24 MONTHS, IRU-600	SNA-BWXXA1002438	$311	20.00	$62	$249
16.003	WARRANTY PLUS IW- WORLD WIDE ,12 MONTHS, CTR 87XX w/Base or CE IMAGE	SWW-BWXXA1001253	$117	20.00	$23	$94
16.004	WARRANTY PLUS IW, WORLD WIDE, 24 MONTHS, WTM-4000	SWW-BWXXA1002440	$311	20.00	$62	$249
16.005	WARRANTY PLUS NW - WORLD WIDE, 12 MONTHS, ODU600	SWW-BNWXA1001243	$546	20.00	$109	$437
16.006	WARRANTY PLUS NW - NA&C, 12 MONTHS, IRU-600	SNA-BNWXA1001238	$389	20.00	$78	$311
16.007	WARRANTY PLUS NW- WW, 12 MONTHS, CTR 87XX w/Base or CE IMAGE	SWW-BNWXA1001253	$317	20.00	$63	$254
16.008	PROVISION PLUS SUPPORT 24 X 7, 12 MONTHS - PROVISION PLUS EM INTEGRATION FOR PROVISION	SWW-P24T3XXX1299	$6,325	20.00	$1,265	$5,060
16.009	PROVISION PLUS SUPPORT 24 X 7, 12 MONTHS - PROVISION PLUS HIGH AVAILABILITY MODULE	SWW-P24T10XX1299	$37,951	20.00	$7,590	$30,361
16.010	PROVISION PLUS SUPPORT 24 X 7, 12 MONTHS - PROVISION PLUS EM & CE, FAULT &	SWW-P24T12671299	$9,488	20.00	$1,898	$7,590
16.011	PROVISION PLUS SUPPORT 24 X 7, 12 MONTHS - PROVISION PLUS EM & CE, FAULT &	SWW-P24T12671253	$182	20.00	$36	$146
16.012	PROVISION PLUS SUPPORT 24 X 7, 12 MONTHS - PROVISION PLUS EM & CE, FAULT &	SWW-P24T12671253	$182	20.00	$36	$146

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County of San Mateo Contract Menu Pricing for Services. Pricing is valid from September 13, 2022 to September 15, 2025.

Item Number		UOM	San Mateo County PRICE	Notes
1	Project manager - Aviat office	Hour	$219	
2	Project engineer - Aviat office	Hour	$203	
3	Transmission engineer - Aviat office	Hour	$176	
4	Network Design engineer - Aviat office	Hour	$225	
5	Configuration engineer - Aviat office	Hour	$140	
6	Drafter - Aviat office	Hour	$111	
7	Field Network Integrator	Hour	$150	Prevailing Wages
8	Field Project Manager	Hour	$132	
9	Tower technician	Hour	$169	Prevailing Wages
10	Project manager - Aviat office	Day	$1,747	8-hour day
11	Project engineer - Aviat office	Day	$1,624	8-hour day
12	Transmission engineer - Aviat office	Day	$1,405	8-hour day
13	Network Design engineer - Aviat office	Day	$1,799	8-hour day
14	Configuration engineer - Aviat office	Day	$1,115	8-hour day
15	Drafter - Aviat office	Day	$887	8-hour day
16	Field Network Integrator daily rate	Day	$1,491	10-hour day, Prevailing wages
17	Field Project Manager daily rate	Day	$1,316	10-hour day
18	Tower technician daily rate	Day	$1,686	10-hour day, Prevailing wages
19	Site Survey	Site	$1,927	Does not include travel
20	Path Survey	Path	$3,395	Does not include travel
21	Path Surveyor Mob/Demob, per person, per occurrence	Each	$4,169	
22	Site Surveyor Mob/Demob, per person, per occurrence	Each	$4,001	
23	Field Network Integrator Mob/demob, per person, per occurrence	Each	$4,001	
24	Tower technician Mob/demob, per person, per occurrence	Each	$3,182	
25	Field living expenses, per person	Day	$538	
26	Frequency Coordination (Frequency Bands-6, 10, 11, 18 and 23 GHz) Standard 30-day PCN			
26.01	*First Frequency Pair (Per Hop)*	Hop	$2,075	
26.02	*Additional Frequency pairs coordinated at the same time (Per hop)*	Hop	$1,416	
27	Frequency Coordination (Frequency Bands-6, 10, 11, 18 and 23 GHz) Expedited 14-day PCN			
27.01	*First Frequency Pair (Per Hop)*	Hop	$2,792	
27.02	*Additional Frequency pairs coordinated at the same time (Per hop)*	Hop	$1,599	
28	Renewal Notices-Required to protect coordinated paths when license filings haven't been submitted.			
28.01	*For first path*	Hop	$485	
28.02	*For each additional path at the same time*	Hop	$121	
29	FCC License Preparation			
29.01	*Per site location*	Site	$1,093	
30	FCC License Submittal Fee			
30.01	*New License-per site location*	Site	$802	
30.02	*Modification to License-per site location*	Site	$478	
31	Factory Services (Per Man Day)			
31.01	*Factory Acceptance Test*	Man-day	$1,697	8 hour day
31.02	*System Integration Product Quality (SIPQ)*	Man-day	$1,697	8 hour day
32	Radio installation and test (IRU600/Eclipse - All indoor radio)- 1+0 Config, 1 antenna	Hop	$10,828	Prevailing Wages
33	Radio installation and test (IRU600/Eclipse - All indoor radio)- 2+0 Config, 1 antenna	Hop	$12,995	Prevailing Wages
34	Radio installation and test (Eclipse - RF-ODU outdoor radio)- 1+0 Config, 1 antenna	Hop	$8,663	Prevailing Wages
35	Radio installation and test (Eclipse - RF-ODU outdoor radio)- 2+0 Config, 1 antenna	Hop	$10,828	Prevailing Wages
36	End to end Network integration and field acceptance testing	Hop	$2,166	Prevailing Wages
37	ODU installation on tower, within 3 ft. of antenna	Each	$1,154	Prevailing Wages
38	Provision server installation and test	Per server	$6,498	Installed during radio mobilization
39	Provision server installation and test	Per server	$10,948	Installed in a separate mobilization
40	Alarm and control tests to NMS system	Site	$1,084	Prevailing Wages
41	Traffic cutover	Hop	$4,332	Prevailing Wages
42	Tower rigging	Per Tower	$1,593	Prevailing Wages
43	Tower crew Mob/Demob, travel expenses and per diem (4-man crew)	Site	$4,087	Prevailing Wages
44	Main Antenna install 1-2' - up to 100' CL w/Alignment	Per Antenna	$4,570	Prevailing Wages
45	Main Antenna install 3-4' - up to 100' CL w/Alignment	Per Antenna	$5,632	Prevailing Wages
46	Main Antenna install 6-8' - up to 100' CL w/Alignment	Per Antenna	$8,829	Prevailing Wages
47	Main Antenna install 10-12' - up to 100' CL w/Alignment	Per Antenna	$14,958	Prevailing Wages
48	Main Antenna install 1-2' - 101 to 200' CL w/Alignment	Per Antenna	$5,090	Prevailing Wages
49	Main Antenna install 3-4' - 101 to 200' CL w/Alignment	Per Antenna	$6,087	Prevailing Wages
50	Main Antenna install 6-8' - 101 to 200' CL w/Alignment	Per Antenna	$9,868	Prevailing Wages
51	Main Antenna install 10-12' - 101 to 200' CL w/Alignment	Per Antenna	$14,958	Prevailing Wages
52	Diversity antenna install 1-2' - 101 to 200' CL w/Alignment	Per Antenna	$3,843	Prevailing Wages
53	Diversity antenna install 3-4' - 101 to 200' CL w/Alignment	Per Antenna	$5,048	Prevailing Wages
54	Diversity antenna install 6-8' - 101 to 200' CL w/Alignment	Per Antenna	$7,583	Prevailing Wages
55	Diversity antenna install 10-12' - 101 to 200' CL w/Alignment	Per Antenna	$13,400	Prevailing Wages
56	Diversity antenna install 1-2' - 101 to 200' CL w/Alignment	Per Antenna	$4,363	Prevailing Wages
57	Diversity antenna install 3-4' - 101 to 200' CL w/Alignment	Per Antenna	$5,567	Prevailing Wages
58	Diversity antenna install 6-8' - 101 to 200' CL w/Alignment	Per Antenna	$8,102	Prevailing Wages
59	Diversity antenna install 10-12' - 101 to 200' CL w/Alignment	Per Antenna	$13,919	Prevailing Wages
60	Antenna stiff arm tie-back material and installation	Per stiff arm	$1,905	Prevailing Wages
61	Main Waveguide (EW52 or EW63) Includes Connector attachment & Grounding	Per Foot	$35	100 feet minimum charge
62	Main Waveguide (EW90) labor only Includes Connector attachment & Grounding	Per Foot	$33	100 feet minimum charge

Item Number		San Mateo County UOM	PRICE	Notes
63	Main Waveguide (EW132/EW180/EW220) Install, Connector attachment & Grounding	Per Foot	$28	100 feet minimum charge
64	Diversity Waveguide (EW52 or EW63) Install, Connector attachment & Grounding	Per Foot	$28	100 feet minimum charge
65	Diversity Waveguide (EW90) Install, Connector attachment & Grounding	Per Foot	$23	100 feet minimum charge
66	Diversity Waveguide (EW132/EW180/EW220) Install, Connector attachment & Grounding	Per Foot	$21	100 feet minimum charge
67	Main Coax (LMR 400) labor only Includes Connector attachment & Grounding	Per Foot	$12	100 feet minimum charge
68	Diversity or hot standby Coax (LMR 400) Install	Per Foot	$10	100 feet minimum charge
69	Sweep Test (VSWR)	Per line	$1,039	Prevailing Wages
70	Install Ice Shield Kit, for 1-2 feet antenna	Per Ice shield	$3,347	Prevailing Wages
71	Install Ice Shield Kit, for 3-4 feet antenna	Per Ice shield	$3,970	Prevailing Wages
72	Install Ice Shield Kit, for 6 feet antenna	Per Ice shield	$4,905	Prevailing Wages
73	Install Ice Shield Kit, for 8 feet antenna	Per Ice shield	$5,944	Prevailing Wages
74	Install Ice Shield Kit, for 10 feet antenna	Per Ice shield	$7,271	Prevailing Wages
75	Install Ice Shield Kit, for 12 feet antenna	Per Ice shield	$9,349	Prevailing Wages
76	Install dehydrator and 6-port manifold - Rack Mounted	Per Unit	$831	Prevailing Wages
77	Install dehydrator and 6-port manifold - Wall Mounted (Includes backboard)	Per Unit	$1,454	Prevailing Wages
78	Install DC power system - Redundant 25 amp charger & 105 Amp-Hr. battery (No AC work)	Per Unit	$2,771	Prevailing Wages
79	Install DC power system - Redundant 50/75 amp charger & 210 Amp-Hr. battery (No AC work)	Per Unit	$3,463	Prevailing Wages
80	Install DC power system - Redundant 150 amp charger & 320 Amp-Hr. battery (No AC work)	Per Unit	$4,386	Prevailing Wages
81	Installation close out package	Site	$924	Prevailing Wages
82	De-Installation			Prevailing Wages
82.01	*Removal of Equipment rack(up to 8 feet high)*	Per rack	$1,032	Prevailing Wages
82.02	*Removal of DC power system - Redundant 25 amp charger & 105 Amp-Hr. battery*	Per Unit	$1,377	Prevailing Wages
82.03	*Removal of DC power system - Redundant 50/75 amp charger & 210 Amp-Hr. battery*	Per Unit	$1,652	Prevailing Wages
82.04	*Removal of DC power system - Redundant 150 amp charger & 320 Amp-Hr. battery*	Per Unit	$1,917	Prevailing Wages
82.05	*Removal of antenna and transport to customer warehouse, 1-2' up to 100' CL*	Per Antenna	$1,154	Prevailing Wages
82.06	*Removal of antenna and transport to customer warehouse, 1-2' 101 to 200' CL*	Per Antenna	$1,501	Prevailing Wages
82.07	*Removal of antenna and transport to customer warehouse, 3-4' up to 100' CL*	Per Antenna	$1,154	Prevailing Wages
82.08	*Removal of antenna and transport to customer warehouse, 3-4' 101 to 200' CL*	Per Antenna	$1,501	Prevailing Wages
82.09	*Removal of antenna and transport to customer warehouse, 6-8' up to 100' CL*	Per Antenna	$1,501	Prevailing Wages
82.10	Removal of antenna and transport to customer warehouse, 6-8' 101 to 200' CL	Per Antenna	$1,847	Prevailing Wages
82.11	*Removal of antenna and transport to customer warehouse, 10-12' up to 100' CL*	Per Antenna	$2,309	Prevailing Wages
82.12	*Removal of antenna and transport to customer warehouse, 10-12' 101 to 200' CL*	Per Antenna	$3,002	Prevailing Wages
82.13	*Removal of Pipe mount*	Per mount	$1,154	Prevailing Wages

Notes and Assumption

1	De-installation/removal assumes original deployment for installation on the same trip and equipment delivered to the customer warehouse within 50 miles of the site. If a special trip to remove items is needed additional mobilization fees will apply.
2	Pricing is for installation, test and de-installation only, material is excluded, unless otherwise specifically noted on individual lines

Exhibit E

AVIAT U.S., INC. LIST OF TRAINING COURSES

1. AviatCare Educate Policy

TECHNICAL TRAINING

AviatCare Educate Policy

1. **Prices for all Training Courses and Services are in USD unless noted otherwise.**
2. **Class size will be limited to 10 students maximum. Larger class sizes will result in additional charges.**
3. **Training Documentation:**
   Aviat Networks provides electronic (soft copy) versions of all material required during the training course. If hard copy versions of the training material are required, then there will be an additional charge for these versions. All training material is copyrighted and cannot be reproduced or distributed.
4. **Courses are written and delivered in English. French and Spanish are available upon request at no additional charge. Other languages can be considered but there will be an additional charge for the material and the delivery of the training.**
5. **A method of payment (Purchase Order, Credit Card, or Wire Transfer) is required to confirm registration.**
6. **Pre-schedule/Open Enrollment Class:**
   - Scheduled according to web calendar.
   - All pre-scheduled / open enrollment classes can be canceled or postponed at the discretion of Aviat Networks. Every effort will be made to notify students within 3 weeks of course start date.
7. **Aviat Networks Training Center - Customer Dedicated Class:**
   - Scheduled according to mutually agreeable dates between customer and Aviat Networks.
   - Conducted at Aviat Networks Training and Education Center for up to 10 students.
8. **On Site Customer Specific Field Class:**
   - Training to be delivered at customer's designated site.
   - Customer must supply equipment for hands on and labs according to class requirements. Aviat Networks can provide equipment based on availability (extra charges will apply).
   - Dates for field training must be requested a minimum of 30 days in advance.
   - Training dates are established on mutually agreeable dates between the customer and Aviat Networks and cannot be confirmed until all documentation is completed, and a purchase order is received.
   - If a visa is required for the trainer to enter the country in which training will be provided, then dates will not be confirmed until the visa has been obtained.
9. **All Quoted prices are valid for a period of ninety (90) days.**
10. **Cancellation Terms**
    - A cancellation fee of 30% will be applied if a customer cancels a class or reservation within 2 weeks of the scheduled start date.
    - A cancellation fee of 50% will be applied if a customer cancels a class or reservation within 1 week of the scheduled start date.

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   - All pre-scheduled / open enrollment classes can be canceled or postponed at the discretion of Aviat Networks. Every effort will be made to notify students within 3 weeks of course start date.
7. **Aviat Networks Training Center - Customer Dedicated Class:**
   - Scheduled according to mutually agreeable dates between customer and Aviat Networks.
   - Conducted at Aviat Networks Training and Education Center for up to 10 students.
8. **On Site Customer Specific Field Class:**
   - Training to be delivered at customer's designated site.
   - Customer must supply equipment for hands on and labs according to class requirements. Aviat Networks can provide equipment based on availability (extra charges will apply).
   - Dates for field training must be requested a minimum of 30 days in advance.
   - Training dates are established on mutually agreeable dates between the customer and Aviat Networks and cannot be confirmed until all documentation is completed, and a purchase order is received.
   - If a visa is required for the trainer to enter the country in which training will be provided, then dates will not be confirmed until the visa has been obtained.
9. **All Quoted prices are valid for a period of ninety (90) days.**
10. **Cancellation Terms**
    - A cancellation fee of 30% will be applied if a customer cancels a class or reservation within 2 weeks of the scheduled start date.
    - A cancellation fee of 50% will be applied if a customer cancels a class or reservation within 1 week of the scheduled start date.

- Aviat Networks is not responsible for any travel or other expenses incurred by students due to the cancellation of a course.

11. Courses cannot be filmed, videotaped or recorded.

12. Access to the various labs and facilities needs to be explicitly granted to each user, and may be limited in time duration, as well as time(s) of the day and/or day(s) of the week. A user should not be using the facility/Lab outside of those times and should be limited to training practice purposes only.

13. Students attending courses are solely responsible for arranging and paying for their travel expenses, meals, accommodations, local transportation, and personal expenses while attending training.

14. Foreign students are responsible for completing and returning the Aviat Networks Foreign National Notification form prior to attending training as a condition of entry to any Aviat Networks facility.

15. Attendance of 100% is required of each student to complete the course and to be awarded a certificate of attendance.

16. Training under Aviat Networks sales orders must be completed within twelve months following first equipment delivery.

17. Smoking is strictly prohibited in all Aviat Networks facilities.

18. Students must always wear their issued identification badge in clear view while visiting Aviat Networks' facilities.

19. Aviat Networks has adopted business casual dress and we appreciate your cooperation. Shorts and open toed shoes are strictly prohibited.

20. Students must comply with all Aviat Networks' security and safety rules and procedures while visiting Aviat Networks' facilities. Our number one concern is visitor safety and compliance with OSHA regulations.

2. Eclipse Installation, Operation and Maintenance Course

EDUCATION SERVICES

Eclipse Installation, Operation and Maintenance Course

TRN-ECL-IOM-A/B/C/D



Course Specifics

Duration:	3 days
Class capacity:	10 students
Location(s) for open enrollment:	San Antonio, TX, USA Hamilton, Scotland, UK Paris, France Lagos, Nigeria Clark, Philippines Mexico City, Mexico
Materials provided:	Student Handbook (e-Book)

Course Description

The Eclipse™ product family is a highly modular and scalable platform that delivers a unique combination of high capacity hybrid or all-packet transport, Carrier Ethernet/IP networking, and comprehensive mission critical microwave features, enabling operators to prepare for the all-IP future.

The **Eclipse Installation, Operation and Maintenance course** teaches students key functions of the Eclipse platform. The course includes an overview of all available equipment, basic configuration with the Portal craft tool, system commissioning, maintenance, diagnostics and troubleshooting. Extensive hands-on labs (nearly 50% of the course duration) offer students with scenarios they will face in real deployments in their networks.

Courses are conducted by **AVIAT expert trainers** in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP networks.

The Eclipse Installation, Operation and Maintenance course is conducted at the Aviat Training locations or can be arranged at customer sites.

Target Audience

This course is intended for installation and service personnel responsible for installation, configuration, test and maintenance procedures for the Eclipse platform.

Prerequisites

1. Participants must complete Eclipse System Overview e-learning course.

2. Participants should have a basic understanding of Electronics, Telecommunications and IP Fundamentals and have basic computer skills.

3. Each student must bring an IBM compatible laptop PC and have administrator rights on the PC (to allow installation of the Portal craft tool).

The PC must have minimum parameters of:

- Pentium 4 or later w/ 1GB of RAM and 250 Mb of free hard drive space
- Microsoft Windows XP, Vista, or Windows 7
- USB Port
- Network card (LAN Port)
- DB9 serial port connection or adapter (optional)

EDUCATION SERVICES

Objectives

Upon successfully completing this course, participants will be able to:

- Basic installation and configuration for Eclipse equipment
- Preventative maintenance on the relevant Eclipse equipment
- Basic diagnostics and troubleshooting of the relevant Eclipse equipment.

EDUCATION SERVICES

Course Outline

Eclipse System Overview
- Introduction to Basic Overview
- Introduction to Node and Terminal Platform

Eclipse Node
- Node Concept
- Basic Architecture and Capabilities
- Indoor Units: INU and INUe
- Slot Assignment Rules
- Backplane Bus
- Node Capacity Rules and Licensing
- Plug-in Cards
- -NCC, -FAN, RACs, -DACs, -AUX, -NPC
- Node and DAC Protection
- RF Unit Overview

Installation and Commissioning
- INU Card Handling and Rules
- Indoor Installation
- Outdoor Installation
- Commissioning
- Configuration Work Flow
- Acceptance Testing
- Records Keeping
- Lab Exercise

Ethernet DAC's
- Eclipse Packet Node
- DAC GE3
- DAC GE
- Modes of Operation
- RWPR
- VLANs
- Link Aggregation
- Link Status Propagation
- QOS and Scheduling
- DAC GE3 Protection
- Lab Exercise

Eclipse Terminals
- Eclipse Terminal Overview
- Eclipse IDU GE3 16x
- Eclipse Terminal protection Operation

Eclipse ODU/RFUs
- ODU 300hp
- ODU 600
- IRU600v1, v2, and v3 (North America only)
- Antenna Mount and Coupler
- RSSI
- RAC-ODU/RFU Cable
- ODU/RFU Block Diagram

Eclipse ODU/RFU Configuration
- Protection Options
- Hot Standby 1+1
- Space Diversity
- Frequency Diversity
- Dual Protection
- TDM Ring Protection, NCM and SPDH
- CCDP with XPIC
- ACM

Portal
- Introduction to Portal Craft Tool
- Portal Installation
- Portal PC Configuration for Ethernet and V.24/RS-232 Connections
- Eclipse Network Management
- Portal Screens
- Lab Exercise

Eclipse Diagnostics and Troubleshooting
- Diagnostics Overview
- LEDs
- Alarms
- HTML Help
- Diagnostics Screens
- Loopbacks
- Event Browser
- Performance and History
- Troubleshooting Overview
- Troubleshooting Path Problems
- Troubleshooting Configuration Problems
- Lab Exercise

Preventative Maintenance
Maintenance Overview
- Inspections
- Trend Analysis
- Fault Analysis and Reporting
- Spares
- Software Management
- Lab Exercise

EDUCATION SERVICES

Required Equipment for Training Sessions at Customer Sites

RADIO	One equipment rack with 48VDC power supply (note; all Eclipse equipment is positive earth) At least 1 Traffic free hop – 2 radios talking to each other. (Path has been simulated with at least 60dB of attenuation, for troubleshooting training variable attenuators are preferred however not mandatory) INU configurations each INU should include as a minimum: •RAC card (with RAC jumper cable and 50ohm cable or M/M N-type adapters to connect to ODU. •DAC card (with relevant traffic cables •Any relevant optional cards. IDU configurations, each IDU should have the following available; •Flash card •Relevant traffic cables •50ohm N-type cable for connection to ODU •ODU's should be a matching pair i.e. same sub band and TR spacing with one being Tx High and the other Tx Lo. INU configurations it is preferred although not essential to have 3 x INU and 2x Pairs of ODU's to allow nodal configurations to be made during the training.
OTHER EQUIPMENT	Not Applicable.
CLASSROOM SET UP	Sufficient in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all students clients PC's and the server or radio as required. **Classroom Equipment** Marker board, SVGA or Overhead projector and screen. **Desk and Chairs** Desks or workstations with enough room for each student to write have open books, client PC and / or, keyboard and monitor. **Internet Access** Internet access through the server or through client PC.

EDUCATION SERVICES

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-ECL-OVIEW-E	ECLIPSE OVERVIEW - ELEARNING -PRICE PER STUDENT
TRN-ECL-IOM-A	ECLIPSE: INSTALLATION, OPERATION AND MAINTENANCE - ILT, 3 DAYS, AVIAT TRAINING CENTER - OPEN ENROLLMENT -PER STUDENT
TRN-ECL-IOM-B	ECLIPSE: INSTALLATION, OPERATION AND MAINTENANCE - ILT, 3 DAYS, AVIAT TRAINING CENTER- 10 STUDENTS MAX
TRN-ECL-IOM-C	ECLIPSE: INSTALLATION, OPERATION AND MAINTENANCE - ILT, 3 DAYS, CUSTOMER LOCATION- 10 STUDENTS MAX
TRN-ECL-IOM-D	ECLIPSE: INSTALLATION, OPERATION AND MAINTENANCE - ILT, 3 DAYS, CUSTOMER LOCATION-WITH EQUIPMENT- ONLY FOR US- 10 STUDENTS MAX

3. ProVision Installation, Configuration & Management

EDUCATION SERVICES

ProVision installation, configuration & Management

TRN-PV-ICM

Course Specifics

Duration:	2 days
Class capacity:	10 students
Location(s) for open enrollment:	San Antonio, TX, USA Hamilton, Scotland, UK Paris, France Lagos, Nigeria Clark, Philippines Mexico City, Mexico
Materials provided:	Instruction Manual (USB) Student Handbook (USB) Datasheets

Course Description

Aviat ProVision™ is a powerful, standards-based Element Management System (EMS). Designed to simplify Carrier Ethernet and TDM network designs and services, it provides superior intelligence for mobile and private network operators. ProVision delivers network management across the full Aviat product portfolio, key partner products and many third-party SNMP-based platforms. It provides efficient, seamless end-to-end network management solutions for TDM, Carrier Ethernet, and hybrid microwave networks.

The ProVision™ Installation, Configuration and Management course provides full guidance on the installation, use and administration of ProVision EMS software. The course will cover in detail all aspects of using the EMS for fault management, configuration management, performance monitoring and reporting.
By leveraging the extensive hands-on labs exercises (50% of the course duration) provided, students will be able to master the ProVision EMS features and significantly reduce complex configuration time for deployment.

Courses are **conducted by AVIAT expert trainers** in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP networks.
The ProVision Installation, Configuration and Management course **is conducted at Aviat Training locations or can be arranged at customer sites.**

Target Audience

This course is intended for Network Operations Center (NOC) operators and engineers involved in managing microwave networks using the ProVision EMS.

Prerequisites

- Participants must complete ProVision System Overview e-learning course
- Participants should have knowledge and experience in the areas of network operations fundamentals and telecommunications fundamentals.
- The student will need a Notebook computer with an Ethernet port and running on one of the following Operating Systems:
  - Windows XP Pro
  - Windows Vista
  - Windows 7
  - Windows 2003 Server
  - Windows 2008 Server

EDUCATION SERVICES

Objectives

Upon successfully completing this course, participants will be able to perform:

- Installation and configuration of ProVision software
- Basic diagnostics, troubleshooting and preventive maintenance of microwave network elements using ProVision EMS
- Setup users and administer features for fault management, configuration management and reporting

EDUCATION SERVICES

Course Outline

ProVision Introduction

- Functions & features
- Minimum hardware specifications
- Understand ProVision Architecture
- Deployment Options

Navigating ProVision

- Main User Interface
- Menu Bar
- Tree Viewer – Physical and Logical Viewer
- Map Viewer, adding a map background to map viewer
- View and change radio configuration
- View and change network IP addresses

Fault Management

- Managing Events – event properties, acknowledge, clear
- Event Browser – filters, browser options, scoreboards
- Viewing Security logs – log on/off, configuration changes
- Configure Event Notifications
- Configure and Interpret Scoreboards

Performance Monitoring

- Configure device data collection
- Interpret performance history & trends
- Set up Performance thresholds
- Interpret Ethernet Bandwidth Utilization
- Produce Inventory & fault reports

Eclipse Features

- Create, trace, view and diagnose circuits
- Perform bulk software loads
- Produce capacity, inventory & fault reports

ProVision Installation and User Administration

- Requirements for ProVision Installation
- ProVision Server and Client Installation
- Verifying ProVision Server is running
- Logging in to Client Software
- Navigating ProVision
- Basic User Account creation and access level

Deploying and Managing Radios and Generic Devices

- Information required for deployment
- Deploying containers – regions, sites and racks
- Deploy, Manage, Rename, Delete and Unmanage Radios and Generic Devices such as switches, routers, third party microwave radios, multiplexers etc
- Deploying EMS/Proxy in ProVision
- Re-parenting an object
- Create, verify and delete a link
- Reposition Map viewer objects – lock/unlock object moving
- Verify ProVision is receiving events

Configuration Management

- View and Change Network IP addresses
- Uploading Eclipse licenses
- Perform Bulk configuration for devices on the Network
- Network Auto-Discovery of Radios and Devices
- Circuit Provisioning and Collection
- Configure Logical Containers
- Creating Map Annotation

Reports

- Generate Helpdesk reports
- Generate Capacity, Inventory and Fault Reports
- Generate Network Health Reports – RF and Ethernet Network Health Reports
- Generate Security Status Report of Radios and Devices
- Configure Schedule Reports
- Customize reports from report fields and objects

ProVision Installation and Administration

- Understand ProVision server/Client relationship
- Creating Regional access for users
- Session Manager Administration
- Email Server Configuration
- Understand communication with Network elements
- Administer database manual and scheduled backup and security profiles
- Northbound Interface (NBI)description and configuration
- Configure ProVision Redundancy Controller
- Discuss remote access options
- Understand licensing requirements and procedures.

Pro Vision VLAN Management

- Viewing Discovered VLANs for Eclipse and CTR 8540 and 8300
- Creating VLANs for Eclipse
- Creating VLANs for CTR 8540 and 8300
- Modifying a VLAN
- Validating VLAN Configuration
- Deleting a VLAN

Ethernet OAM Management

- Viewing Discovered EOAM Maintenance Associations
- Viewing EOAM Configuration Details
- Configuring EOAM
- Configuring EOAM to provide Fault Monitoring of VLANs for Eclipse
- Validating EOAM Configuration

EDUCATION SERVICES

ERP Ring Management

- Viewing Discovered Layer 1 and ERP Rings
- Viewing Ring Configuration Details
- Configuring ERP Rings
- Modifying an ERP Ring
- Deleting an ERP Ring
- Validating ERP Ring Configuration

EDUCATION SERVICES

Required Equipment for Training Sessions at Customer Sites

RADIO	One equipment rack with 48VDC power supply (if using 48VDC PoE units). At least 1 Traffic free hop – 2 radios talking to each other. (Path has been simulated with at least 60dB of attenuation, for troubleshooting training variable attenuators are preferred however not mandatory). One hub or switch One computer per 2 students One computer (when TNET Proxy Server and/or TNET equipment is required) 240v power points Radio links can be hired for duration of training course if required.
OTHER EQUIPMENT	Computer requirements: 2 GHz processor (w/512K cache) 1GB memory or greater GB Hard disk space CD-ROM Video Card Capable of 1024x768 "True Color" or higher Windows 2000/ XP/ Vista LAN card USB port CAT 5 cables
CLASSROOM SET UP	Sufficient in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all students clients PC's and the server or radio as required. **Classroom Equipment** Marker board, SVGA or Overhead projector and screen. **Desk and Chairs** Desks or workstations with enough room for each student to write have open books, client PC and / or, keyboard and monitor. **Internet Access** Internet access through the server or through client PC.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-PV-OVERVIEW-E	Provision Overview eLearning -price per Student
TRN-PV-ICM-A	ProVision: Installation, Configuration and Management - ILT, 2 DAYS, Aviat Training Center - Open Enrollment -per Student
TRN-PV-ICM-B	ProVision: Installation, Configuration and Management - ILT, 2 DAYS, Aviat Training Center- 10 Students Max
TRN-PV-ICM-C	ProVision: Installation, Configuration and Management - ILT, 2 DAYS, Customer Location- 10 Students Max
TRN-PV-ICM-D	ProVision: Installation, Configuration and Management - ILT, 2 DAYS, Customer Location- with Equipment- only for US- 10 Students Max

4. ProVision Plus Management & Applications Platform

EDUCATION SERVICES

ProVision Plus

Management & Applications Platform

TRN-PVPLUS-ICM-A/B/C/D



Course Specifics

Duration:	2 days
Class capacity:	10 students
Location(s) for open enrollment:	San Antonio, TX, USA Hamilton, Scotland, UK Paris, France Lagos, Nigeria Clark, Philippines México City, México
Materials provided:	Student Handbook (e-Book)

Course Description

The Aviat Networks ProVision Plus is Aviat's next generation management and application platform, designed from the ground up to minimize the total cost of ownership and maximize the intelligence and flexibility of modern complex microwave networks. ProVision Plus is designed to be open and programmable to enable custom built applications to automate the microwave lifecycle.

ProVision Plus is an easy to use web-based system accessed via modern web browsers such as Google Chrome and Microsoft Edge. No client application installation is required, minimizing deployment and support cost. Multiple server deployment options are available. Provision Plus is designed for premise deployments and compliments AviatCloud for cloud-based installations.

Courses are **conducted by AVIAT expert trainers** in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP/MPLS networks.

The course is conducted a**t Aviat Training locations or can be arranged at customer sites.**

Target Audience

This course is intended for Network Operations Center (NOC) operators and engineers involved in managing microwave networks using the ProVision Plus EMS.

Prerequisites

- Participants must complete ProVision System Overview e-learning course
- Participants should have knowledge and experience in the areas of network operations fundamentals and telecommunications fundamentals.
- The student will need a Notebook computer with an Ethernet port and running on one of the following Operating Systems:
  - Windows XP Pro
  - Windows Vista
  - Windows 7
  - Windows 10

EDUCATION SERVICES

Objectives

Upon successfully completing this course, participants will be able to perform:

- Installation and configuration of ProVision Plus software
- Basic diagnostics, troubleshooting and preventive maintenance of microwave network elements using ProVision plus EMS
- Setup users and administer features for fault management, configuration management and reporting
- Monitoring MPLS networks

EDUCATION SERVICES

Course Outline

ProVision Plus Introduction

- Functions & features
- Minimum hardware specifications
- Understand ProVision + Architecture
- Deployment Options

Navigating ProVision

- Main User Interface
- Menu Bar
- Tree Viewer
- Map Viewer
- View and change radio configuration
- View and change network IP addresses

Fault Management

- Managing Events – event properties, acknowledge, clear
- Event Browser – filters, browser options

Performance Monitoring

- Check the equipment performance

ProVision + Installation and User Administration

- Requirements for ProVision + Installation
- ProVision + Installation
- Verifying ProVision + is running
- Logging in to the Software
- Navigating ProVision
- Basic User Account creation and access level

Deploying and Managing Radios

- Information required for deployment
- Deploying containers – regions, sites and racks
- Deploy, Manage, Rename, Delete and Unmanage Radios

Synchronizing Live and baseline database

- Network monitoring
- Network layer management

ProVision Installation and Administration

- Creating Regional access for users
- Session Manager Administration
- Email Server Configuration
- Understand communication with Network elements
- Administer database manual and scheduled backup and security profiles
- Understand licensing requirements and procedures.

MPLS network management

- Physical link
- LSP link
- LSP
- TE link
- TE Tunnel

MPLS service operation management

- PW (Pseudowire)
- L2VPN services layer
- RT Link
- L3VPN services layer

Maintenance and troubleshooting

- Ping
- Trace
- Diagnostics History
- System message

EDUCATION SERVICES

Required Equipment for Training Sessions at Customer Sites

RADIO	Not Applicable.
OTHER EQUIPMENT	Not Applicable.
CLASSROOM SET UP	Enough in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all student's client's PC's and the server or radio as required.

Classroom Equipment

Marker board, SVGA or Overhead projector and screen.

Desk and Chairs

Desks or workstations with enough room for each student to write have open books, client PC and / or, keyboard and monitor.

Internet Access

Internet access through the server or through client PC.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-PVPLUS-ICM-A	PROVISION PLUS: INSTALLATION, CONFIGURATION AND MAINTENANCE - ILT, 2 DAYS, AVIAT TRAINING CENTER - OPEN ENROLLMENT -PER STUDENT
TRN-PVPLUS-ICM-B	PROVISION PLUS: INSTALLATION, CONFIGURATION AND MAINTENANCE - ILT, 2 DAYS, AVIAT TRAINING CENTER- 10 STUDENTS MAX
TRN-PVPLUS-ICM-C	PROVISION PLUS: INSTALLATION, CONFIGURATION AND MAINTENANCE - ILT, 2 DAYS, CUSTOMER LOCATION- 10 STUDENTS MAX
TRN-PVPLUS-ICM-D	PROVISION PLUS: INSTALLATION, CONFIGURATION AND MAINTENANCE - ILT, 2 DAYS, CUSTOMER LOCATION-WITH EQUIPMENT- ONLY FOR US- 10 STUDENTS MAX
TRN-PVPLUS-OVIEW-E	PROVISION PLUS OVERVIEW ELEARNING -PER STUDENT

5. CTR8740 Advance MPLS Features

EDUCATION SERVICES

CTR8740 ADVANCED MPLS FEATURES

TRN-CTR8740-MPLS A/B/C/D

Course Specifics

Duration:	3 days
Class capacity:	10 students
Location(s) for open enrollment:	San Antonio, Texas, USA Hamilton, Scotland, UK Paris, France Lagos, Nigeria Clark, Philippines Mexico City, Mexico
Materials provided:	Student Handbook (e-Book)



Course Description

The Aviat Networks Advanced MPLS Features course is recommended for design, field and operations personnel who design, deploy, configure and operate IP networking equipment involving advanced routing protocols and IP/MPLS. This Three-day instructor-led course builds on foundational routing and networking knowledge and introduces MPLS. This is followed by an in-depth overview of MPLS technology, including concepts, services, architecture, configuration, design issues, operations, troubleshooting, LDP, L2-VPN, L3-VPN, QoS.

The course content is enriched with hands-on labs (nearly 50% of the course duration) and case studies that offer students scenarios they will face in real deployments in their networks. All labs are conducted on the Aviat CTR8740 microwave router platform equipment enriched with the latest MPLS Advanced software.

Courses are **conducted by AVIAT expert trainers** in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP/MPLS networks.

Target Audience

This course is intended for engineers requiring an advanced knowledge of IP routing, MPLS and Traffic Engineering concepts within an IP/MPLS network.

Prerequisites

- Participants must have completed the Aviat CTR 8740 L3 routing Protocols (OSPF / BGP) or having a high knowledge those routing protocol.
- Each student must have a laptop with administrative rights to install and run IP networking simulation software.

Objectives

Upon successfully completing this course, participants will be able to:

- Learn MPLS concepts, terminology, objectives and applications.
- Develop a strong understanding of implementing MPLS-based applications using L2VPNs, L3VPNs.

EDUCATION SERVICES

Course Outline

MPLS Concepts

- Objectives of MPLS
- Applications of MPLS
- MPLS Architecture
- Variants of MPLS: MPLS-TE; GMPLS; MPLS-TP
- Ingress & Egress Label Edge Routers
- Forward Equivalence Class
- Functions of Label Switched Routers and Requirements of LSPs
- MPLS Labels and Label Stack
- Forwarding Labeled Packets

Label Distribution Protocol (LDP)

- LDP Protocol definition and advantages
- Static LSP versus Dynamic LSP
- LDP traffic and flow control
- IP routing process versus MPLS LDP process
- LDP messaging
- Building and LDP routing tables set up
- Label distribution; Downstream unsolicited mode
- Label distribution; On demand mode
- Label retention mode
- LDP convergence
- Penultimate Hop Popping
- Targeted label distribution mode

MPLS Virtual Private Network Technology

- Introducing Virtual Private Networks
- Introducing MPLS VPN Architecture
- Introducing the MPLS VPN Routing Model
- Forwarding MPLS VPN Packets

MPLS-Based Applications - L2 VPNs

- L2 VPN Overview, VPWS and VPLS
- VPWS Point to Point Solutions
- VPWS Frame Forwarding
- Pseudowire Architecture
- L2TPV3
- ATOM
- Pseudowire Discovery and Signaling
- Label Mapping Message TLVs
- The Control Word
- MPLS QoS
- Ethernet over MPLS (EoMPLS)
- EoMPLS Port mode and VLAN Mode
- MPLS VPLS (L2 Multipoint-to-Multipoint service)
- VPLS Architecture
- VPLS Configuration

MPLS-Based Applications - IP VPNs (L3 VPNs)

- CE-PE Interfaces
- How packets are associated with VRFs
- Label stacking aiding VPN support
- Use of MP-BGP within L3 VPNs
- Forwarding packets across the MPLS network
- Route Distinguisher
- Route Target: Import and Export targets
- Route distribution in MPLS L3 VPN
- Route and Label advertisement
- Independence from VPN addressing
- CE-PE Routing Protocols

EDUCATION SERVICES

Required Equipment for Training Sessions at Customer Sites

RADIO	Not Applicable.
OTHER EQUIPMENT	Not Applicable.
CLASSROOM SET UP	Sufficient in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all students clients PC's and the server or radio as required. Classroom Equipment • Marker board, SVGA or Overhead projector and screen. Desk and Chairs • Desks or workstations with enough room for each student to write have open books, client PC and / or, keyboard and monitor. Internet Access • Internet access through the server or through client PC.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-CTR8740-MPLS-A	CTR 8740: Configuration and Maintenance, MPLS - ILT, 3 DAYS, Aviat Training Center - Open Enrollment -per Student
TRN-CTR8740-MPLS-B	CTR 8740: Configuration and Maintenance, MPLS - ILT, 3 DAYS, Aviat Training Center- 10 Students Max
TRN-CTR8740-MPLS-C	CTR 8740: Configuration and Maintenance, MPLS - ILT, 3 DAYS, Customer Location- 10 Students Max
TRN-CTR8740-MPLS-D	CTR 8740: Configuration and Maintenance, MPLS - ILT, 3 DAYS, Customer Location-with Equipment- only for US- 10 Students Max

6. CTR8740 Configuring IP/Layer 3 Features

EDUCATION SERVICES

CONFIGURING CTR8740 IP/LAYER 3 FEATURES

TRN-CTR8740-CML3 A/B/C/D

Course Specifics

Duration:	2 days
Class capacity:	10 students
Location(s) for open enrollment:	San Antonio, Texas, USA Hamilton, Scotland, UK Paris, France Lagos, Nigeria Clark, Philippines Mexico City, Mexico
Materials provided:	Student Handbook (e-Book)



Course Description

The Aviat Networks **CONFIGURING CTR8740 IP/LAYER 3 features** course is recommended for design, field and operations personnel, who design, deploy, configure and operate IP networking equipment involving advanced routing protocols in Layer 3. This two (2) day instructor-led course is focused on configuration of IP/Layer 3 features on the CTR 8740 platform. Topics include configuration and use of OSPF and BGP.

The course content is enriched with hands-on labs (nearly 50% of the course duration) and case studies that offer students scenarios they will face in real deployments in their networks.

Courses are **conducted by AVIAT expert trainers** in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP/Layer 3 networks. The course is **conducted at Aviat Training locations or can be arranged at customer sites**.

Target Audience

This course is intended for engineers requiring knowledge of how to configure IP routing and Layer 3 features on the CTR 8740 platform.

Prerequisites

- Participants **must have** completed
  - **Aviat CTR8740 Installation, Operation, and Maintenance** course that provides knowledge of the setup, trouble shooting and operation of CTR platforms including configuration of Carrier Ethernet (Layer 2), QoS, and Microwave features.
  - **Aviat Basic Networking and IP Routing course** or have completed equivalent study on other vendor platforms, sufficient enough to demonstrate knowledge of Basic Networking including VLANs, Switching and IP Routing Protocols.

Objectives

Upon successfully completing this course, participants will be able to:

- Understand core routing concepts involving advanced protocols such as BGP and OSPF configuration on the CTR 8740 platform

EDUCATION SERVICES

Course Outline

IPv4 unicast routing and forwarding

Routing protocols

- Understand routing protocols
- Autonomous system (AS)
- Intra AS
  - OSPF / IS-IS
- Inter AS
  - BGP

CTR 8740 IP Setup

- System Overview
- CLI and Web Browser GUI
- Management Port configuration
- IP Interface Configuration
- Static Routes
- Basic Setup Lab

OSPF configuration

- Understand the OSPF routing protocol:
- Single-area OSPF
- Multi-area OSPF
- Multi-area OSPF with stub network
- OSPF configuration Labs

BGP concept and configuration

- Understand BGP routing protocols
- Internal and External BGP
- BGP peers
- BGP attributes
- BGP route selection
- BGP states
- BGP configuration Labs

EDUCATION SERVICES

Required Equipment for Training Sessions at Customer Sites

RADIO	Not Applicable.
OTHER EQUIPMENT	Not Applicable.
CLASSROOM SET UP	Sufficient in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all students clients PC's and the server or radio as required. Classroom Equipment • Marker board, SVGA or Overhead projector and screen. Desk and Chairs • Desks or workstations with enough room for each student to write have open books, client PC and / or, keyboard and monitor. Internet Access • Internet access through the server or through client PC.

- Each student must have a laptop with administrative rights to install and run IP networking simulation software.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-CTR8740-CML3-A	CTR 8740: Configuration and Maintenance, Layer 3 - ILT, 2 DAYS, Aviat Training Center - Open Enrollment -per Student
TRN-CTR8740-CML3-B	CTR 8740: Configuration and Maintenance, Layer 3 - ILT, 2 DAYS, Aviat Training Center- 10 Students Max
TRN-CTR8740-CML3-C	CTR 8740: Configuration and Maintenance, Layer 3 - ILT, 2 DAYS, Customer Location- 10 Students Max
TRN-CTR8740-CML3-D	CTR 8740: Configuration and Maintenance, Layer 3 - ILT, 2 DAYS, Customer Location-with Equipment- only for US- 10 Students Max