



Lewis County

**REQUEST FOR
PROPOSAL**

FOR

**MICROWAVE NETWORKING EQUIPMENT
FOR LEWIS COUNTY PUBLIC SAFETY RADIO
RELATED TO THE DEPARTMENT OF
JUSTICE COMMUNITY ORIENTED
POLICING (COPS) OFFICE TECHNOLOGY
AND EQUIPMENT PROGRAM (TEP) GRANT**

Attachment B

SECTION 1

TECHNICAL REQUIREMENTS

1. Project Description

Lewis County Communications is located in Chehalis, WA. Lewis County encompasses roughly 2400 square miles. The county consists of varying terrain from low land farm area to mountainous hilly terrain ranging from sea level to 5300 feet. The county spans approximately 90 miles stretching from west to east and 25 miles north to south. Lewis County is bordered by Thurston County to the north, Yakima County to the east, Cowlitz County to the south, and Pacific County to the west.

Most of the Lewis County Communication sites are served by a mix of 6 and 11 Ghz and 4.9 and 5.8 Ghz microwaves systems ranging from Alcatel MDR8000 to Motorola Cambium microwave links configured with the topologies depicted in Attachment C of this RFP. The sites are serviced partially by county owned equipment as well as shared microwave with other agencies. The existing microwave network is used to interconnect Lewis's Land Mobile Radio (LMR) sites to the Lewis County Communications center at 351 NW North Street in Chehalis.

The current system carries a range of T1 connections and Attachments only 2 primary links to carry IP based traffic on county owned platforms.

With this RFP, Lewis County will procure a mixed TDM and IP (Internet Protocol) and scalable traffic payloads system. The successful bidder will design, furnish, and install the system. The county radio services department will be responsible for removing old, antiquated equipment in the future after additional system components have been replaced.

Payload scaling and bandwidth allocation, within the limits of the purchased software, hardware, and FCC licenses, shall be completed by the customer locally, or via the manufacturer's factory or support organization through remote access, on a dynamic basis by properly trained technical personnel.

The existing system utilizes both non-protected (NP) and monitored hot standby (MHSB) repeaters/terminals in the layout shown in the attached Attachments. In the future, as Lewis County migrates its LMR infrastructure to fully IP enabled systems, the existing T1 traffic is expected to be reduced on the microwave network at which time the new microwave system would carry IP traffic after the additional system improvements are completed. In this RFP the complete program of work and equipment is referred to as the "Furnished System" for convenience.

1.1 Reliability

The Furnished System shall be designed by the vendor, based upon their unique equipment capabilities, to reliably meet or exceed 99.999% two-way availability measured on an annualized basis on a per-link basis. Replacement of existing antenna and waveguide systems shall be assumed by the vendor.

1.2. Minimum Traffic Payload

Lewis County contemplates that the minimum traffic payload on any single hop will be ≥ 100 Mbps for its new LMR system. The Furnished System shall be configured as a Layer 3 network.

To facilitate transition of the existing traffic to the Furnished System, it shall support the existing capacity DS-1 circuit requirements as described in the Attachments and ≥ 45 Mbps for the new LMR system.

Traffic grooming and the transition plan to migrate Lewis County's traffic payload from the existing microwave radio system onto the new Furnished System shall be the responsibility of the successful Contractor. Planning and close coordination with Lewis County is required to prevent service outages. Traffic not groomed into DS1 circuits shall be carried and presented as Ethernet traffic organized into four (4) separate VLANs. The VLANs shall be:

- LMR Radio (≥ 10 Mbps)
- Site Management (≥ 5 Mbps)
- Video (≥ 60 Mbps)
- Spare (≥ 10 Mbps)

Each VLAN for each link shall be presented on an individual electrical Ethernet port at each site. The sites shall be configured with modulation modes and protection schemes which the Contractor shall design and present to Lewis County for approval. The Contractor shall include its proposed design configuration with its response to this RFP.

The Contractor shall describe its automatic ring and hot/standby service solution in its proposal.

2. General Requirements

The Furnished System shall include, but is not limited to, digital microwave radios, switches/traffic protection equipment, order wire for each site, alarm and control technology and interfaces, and any other equipment required for a complete and operational system.

Vendor solutions shall be provided which minimize or eliminate the risk of failure from any single point outage of a specific component or assembly that impairs the reliability objectives of this Section under normal operating conditions.

2.1 Network Reliability and Qualification Services

The successful Contractor shall be responsible for the total system turnkey design and implementation, which shall include services such as, but not limited to:

- Field based path surveys, if required by the Vendor, to finalize new antenna centerlines and warrant reliability of the paths and the overall network consistent with the requirements of this specification.
- Design of the network topology to achieve the performance requirements.
- If required by the vendor to validate the design, field path surveys shall be performed.
- Frequency search, interference analysis, Prior Coordination Notices (PCNs) and/or other public notices and frequency coordination including re-coordination/modification of Lewis County's existing FCC Part 101 license authorizations to re-purpose the existing FCC licenses authorizations for use with the new system; and,
- Compliance with the latest FCC Rules, Part 101 and related requirements; and,
- Preparation of FCC Form 601 microwave license applications; and,
- Factory testing of the assembled microwave hardware in staged configuration and demonstration of readiness for field deployment.

Following Contract award, the successful Contractor shall schedule their work to be ready to submit, for FCC licensing, all license applications within 45 business days after notice to proceed with the path survey work. The Contractor shall pay any required frequency coordination fees directly to the coordination body. The Vendor shall identify a frequency coordination agent based on master contracts or other bulk coordination arrangements which will minimize Lewis County Communications' cost

3. Microwave Antenna Systems and Waveguide

Given that the existing microwave system is carrying Lewis County's public safety traffic, after award of the contract, the Contractor shall develop and submit to Lewis County a plan for each site of how the antenna / waveguide system will be installed and the impact on reliability and performance of the existing system.

3.1 Antenna System Performance

The vendor's proposal shall indicate the antenna make, model, and centerline used in the feasibility path studies which form the basis of the proposal. All antennas shall include radomes.

Class "A" parabolic antennas are assumed to be the minimum acceptable design. Vendors proposing high performance antennas for any link shall narratively explain the rationale for that selection as part of their proposal.

3.2 Waveguide and Connectors

The new waveguide systems needed to achieve the required performance and reliability shall indicate the make, model, and length of waveguide and connectors which form the basis of the proposal.

3.3 Tower Structural Analysis

As part of its proposal, if the quantity, size or location of antennas on the towers will change, the Contractor shall utilize Northwest Tower Engineering <http://www.nwtower.net/> to determine whether the tower will accommodate the load.

The cost of the analysis shall be included in the proposal.

The cost to modify towers will be determined after the contract is awarded.

4. Dehydrator, Manifolds, and Pressure Gauges

The vendor shall furnish, install, and test waveguide system dehydrators, manifolds, and pressure gauges at each site of the work. The dehydrators shall maintain sufficient pressure and volume to achieve the waveguide supplier's design requirements.

5. Furnished System Equipment Input Power Source

All equipment shall be designed and proposed to support A/B (dual) power input sources. Equipment furnished in response to this specification shall be powered from the Owner's existing 48 VDC power plant.

Any equipment proposed by the vendor which is not capable of operating from 48 VDC in its native state (i.e. power inversion or voltage change required), shall be specifically identified in the proposal response.

The radio equipment shall be rack-mounted inside each building. Outdoor radios mounted on the tower or antenna are not allowed.

At the top of each microwave rack the vendor shall provide a DC distribution panel which shall become the point of demarcation between the DC power feeds and vendor's Furnished System equipment. This distribution panel shall be equipped with sufficient resettable DC circuit breakers (plus two spares of each size for each site) to power equipment contained within the rack.

Two 20 Amp 48VDC circuit breakers to supply the Furnished System to supply the equipment will be available at each site. If 20 Amp is not sufficient, the required circuit breaker size shall be specified in the proposal.

Each proposal shall include an Exhibit, identifying the proposed microwave equipment complement, by site, and shall identify the proposed thermal contribution and current consumption (in Amps) for each rack or cabinet. Current consumption shall identify both inrush current (e.g. radio boot -up) as well as static current loads in tabular form along with the vendor's requested circuit breaker rating for both the A and B power legs at Lewis County's existing DC distribution panel.

6. General Digital Microwave Equipment Requirements

This paragraph describes the non-frequency specific requirements of the microwave radio equipment specifications. All microwave radios shall be fully synthesized. Access to frequencies within a specific band (lower/upper 6 GHz) and 11 GHz shall be possible within a particular manufacturer's radio band family.

6.1 Electromagnetic Susceptibility and Spurious Radiation

The Furnished System equipment shall be designed to operate in a radio communications equipment environment installed in or near the vicinity of other types of equipment which may include but is not limited to:

- 100-watt VHF (150 MHz), 380-470 MHz, 700 MHz and 800 MHz transmitters and receivers.
- Microwave transmitters with up to 39 dBm output power.
- A portable radio transmitter operating at 6 watts or less in the 140 to 165 and 440 to 470 MHz band, and 4 watts or less in the 805 to 861 MHz bands, within 12" of the Furnished Equipment.

The Furnished System shall not emit spurious or unwanted Radio Frequency Interface (RFI) to any of the co-located equipment at any level and/or frequency which causes measurable performance degradation.

6.2 Physical Requirements

The Furnished System equipment described in these specifications shall be factory staged and capable of being mounted in a standard 7'-0" high 19-inch aluminum unpainted equipment rack (e.g. Chatsworth Products 4635 3-503 or equal) for each site.

All indoor equipment shall operate and meet specifications over the temperature range of 0 to +50 degrees C and at elevations above sea level at the sites where installed.

6.3 Multiplex Equipment

All terminal and repeater equipment shall be designed with multiplex equipment to convert the signaling speeds and formats internal to the microwave equipment to the DS1 level and/or mixed traffic of NxDS1 and data from 10/100BaseT port(s).

7. Path Reliability and Outages

The vendor's proposal shall identify and include information in its proposal response describing the parameters used to design the Furnished System.

The following and other parameters used by the vendor shall be included.

- Vigants Barnett model
- Digital, 64 QAM Minimum Modulation Mode Assumed
- $K=4/3$
- First Fresnel Zone 0.6
- An inspection of Google Earth for foliage and other obstructions
- Field based path observations
- Assumed minimum transmitter power, receiver sensitivity, antenna sizes/gains, insertion losses as shown in the individual path calculation sheets.

8. Traffic Protection

The Furnished System shall incorporate a method of traffic protection which shall be described in the vendor's proposal. Lewis County prefers that the traffic protection methods are internal to the manufacturer's hardware and not require separate external loop switches (in the case of TDM traffic) or external third-party routers (in the case of IP traffic).

The proposal shall describe how alternative transport technologies (e.g. fiber into the overall transport architecture), shall be integrated into the Furnished System utilization, traffic protection, and monitoring. The traffic protection shall utilize field-proven techniques to eliminate 'broadcast storms' or other outages which impair Lewis County's access to and use of the other connected systems. A description of the convergence time to effect traffic protection switching shall be included with the proposal.

9. Guaranteed Minimum Performance Specs

- System gain
- Transmitter power (measured at antenna flange)
- Receiver threshold sensitivity (measured at antenna flange)
- Bit Error Rate (BER) performance at various modulation modes
- Percent availability

10. Alarm Interface Demarcation

At each site where Furnished System equipment is installed the alarm interface demarcation shall be on a standard 66 block.

At minimum, the Furnished System shall be capable of providing minor and major alarms generated by each of the technology elements . Minor and major alarm configuration shall be coordinated with Lewis County radio services and adjusted by county tech team.

11. Service Channel

Each hop of the Furnished System shall include at least two (2) digital service channels. Each proposal shall stipulate the maximum payload and protocols supported by the service channel(s).

12. Jack Fields and Circuit Presentation

Each communication or data circuit shall be presented on 24 port (minimum) RJ-45/RJ-48 jack fields mounted in the microwave equipment rack and tested at the factory.

13. Special Considerations for Monitored Hot Standby (MHSB) Links

Hitless/errorless receiver switching is desired for MHSB links. Transmitter switching time of ≤ 50 ms is required. The proposed MHSB solution shall be designed to minimize branching loss and the proposal shall describe all design assumptions for MHSB switching and branching losses.

14. Factory Testing Requirements and Documentation

Equipment for every site shall be staged, assembled, and tested in the manufacturer's factory. Testing shall verify that every system assembly meets its design objectives which shall be so certified by a signed test report from the manufacturer's representative performing the test. A printed and electronic packet of "birth certificate" information shall be generated which shows, at minimum:

- Transmitter power output
- Receiver sensitivity
- AGC curves
- Modulation mode
- Protection performance
- Software and hardware revision versions
- Options and parameter settings

The Owner (Lewis County) may elect to witness factory testing for some or all links of the furnished system. Suitable advance notice shall be provided to permit scheduling and observation of factory testing. Any module or assembly which fails factory testing shall be subjected to re -testing until required performance is achieved.

15. Field Testing and Documentation

Field documentation shall include all the documentation requirements of Section 5 of this RFP. With the proposal, the vendor shall describe their typical recommended practices, as well as a documentation example, for field testing and commissioning the Furnished System

16. Furnished System Management and Control

16.1 Craft Interface

The Furnished System shall include a craft interface that permits connection of a browser equipped computer to access and set parameters of both the local network element hardware and software and, using the communications pathways provided by the Furnished System, shall allow access to any remote network element. The craft interface shall operate using the most current version of Microsoft Windows which is available when the Furnished System ships from the factory.

The craft interface shall be password protected and offer layered access for security. IP and serial connections for connecting the local computer to the craft interface is desirable. Any limitations associated with the craft interface shall be identified in the proposal. Such limitations may include, but are not limited to: specific version of Microsoft Windows operating system, specific required browser supplier and version, serial communication speed/parity, pre-provisioning control, diagnostic tools, alarm observation, performance observation on a per-radio and link basis, software upload/download, etc.

If the vendor offers a simple local tool (e.g. keypad or other display screen) that allows quick viewing of network craft features without connecting a computer, one such tool shall be included for each site where Furnished System equipment is located.

Describe any limitations to remote (off-site) access by interfacing the craft interface to a suitably protected IP connection (e.g. Internet) to allow remote maintenance and surveillance.

16.2 Network Element Manager (NEM) Option

As an option to the base proposal, the vendor may quote a NEM tool. The proposal shall describe how this tool will interface with, remotely control, and accept traps from, both Furnished System hardware as well as downstream systems connected to the Furnished System.

The required hardware and software needed to support the NEM functionality shall be included in the option cost. A description associated with this option shall be provided by the vendor or which includes any sizing considerations (e.g. total number of NEM devices supported), limitations, or pre-requisites to implementing the NEM solution with the Owner's current and future systems.

Ideally, if selected by the Owner, the NEM option will be capable of end-to-end network surveillance, including non -Furnished System technologies (e.g. Owner's owned/leased fiber) to observe, measure, and isolate characteristics such as jitter, latency, packet loss, BER, consistent with industry standards.

The proposal shall describe if the NEM option is a manufacturer integrated/branded solution, or a separate stand-alone application acquired from others and offered for this project.

The proposal shall describe any limitations to remote (off-site) access by interfacing the NEM interface to a suitably protected IP connection (e.g. Internet) to allow remote maintenance and system surveillance

17. Grounding

Grounding should be completed to existing system at each site.

18. Other Proposal Information Required

Vendor's proposals shall provide answers to the following with their response:

- 1) What is the City, State, and Country of equipment manufacture for the Furnished System?
- 2) What is the City, State, and Country where field and factory product engineering and field support people are located who support the Furnished System?
- 3) What are the specific locations of the two geographically closest (to Lewis County) factory-trained or manufacturer-certified technical support resource organizations for the Furnished System ?
- 4) Specify any external or independent testing certifications previously performed on the proposed equipment and the manufacturing processes.
- 5) Specify the number of individual microwave radios sold of the type proposed to address this RFP and total number of complete microwave systems implemented over the life of the company.
- 6) Encryption: Although not required as part of the current procurement, the Furnished System shall support FIPS 140-2 encryption. The proposal shall include a brief description of how encryption is accomplished in a post-sale, previously deployed configuration.

19. Decommission, Dismantle & Remove Old Equipment

Each vendor's proposal shall identify the cost to safely dismantle and carefully remove any identified existing equipment (include loop switching equipment). Such dismantled equipment shall remain as the property of Lewis County and be delivered, by the Contractor, to a designated storage location within Lewis County. The Contractor shall maintain a simple inventory of all such equipment removed and so tendered to Lewis County. The inventory shall be updated and provided to Lewis County daily.

20. Equipment Spares

A complement of spares as identified in the RFP in the scope of work section shall be included in the response. This equipment should include:

- (1) of each microwave radio type/frequency
- (1) of each microwave power supply
- (1) of each network switch

21. Special Pre-Cutover Testing

Where any cut-over to new system is required, the vendor's proposal shall describe a suitable field testing method of each T1 and IP circuit at each location.

Tests shall conform to applicable industry standards.

All pre-cutover plans shall be coordinated and approved by county tech teams with ample notice given to ensure communication shall be made to users and dispatch staff.

Required, calibrated test equipment to complete and document the pre-commissioning tests shall be provided by the contractor.

Spot check witnessing of pre-cutover testing may be performed by Lewis County tech team at its discretion.

All test results shall be electronically captured and included as part of the documentation requirements identified in Section 5 of this RFP.

END OF SECTION 1 TECHNICAL REQUIREMENTS

SECTION 2 EXISTING SYSTEM

1. Overview

Lewis County's existing microwave radio system is a single path no ring configuration consisting of a total of 5 county owned paths and utilization of 6 additional outside agency paths. Currently only 3 county owned links have IP capacity. All other links are utilizing T1 traffic only. This current configuration is listed below.

COUNTY OWNED MICROWAVE

- Crego to Dog 6 Ghz MDR8000 T1 microwave
- Crego to Courthouse 6 Ghz Nokia T1/IP microwave
- Courthouse to Chehalis Ridge 11 Ghz Motorola Cambium IP microwave
- Hopkins to Toledo 4.9 Ghz Motorola IP microwave
- Cooks to Seminary 4.9 Ghz Motorola IP microwave

SHARED MICROWAVE

- Crego to Coal Mine 5.8 Ghz Motorola IP microwave (RFA Owned)
- Coal Mine to Cooks 5.8 Ghz Motorola IP microwave (RFA Owned)
- Crego to Manners 5.8 Ghz Motorola IP microwave (RFA owned)
- Dog to Hopkins T1 circuit on WSDOT microwave
- Dog to Bennett T1 circuit on WSDOT microwave
- Bennett to Packwood T1 circuit on WSDOT microwave

Attachment C provides current microwave configuration.

Attachment D provides proposed new network path configuration.

END OF SECTION 2