Requirement Title:

USPTO Enterprise PEWLAN2 Wifi Upgrade

1 Background

The United States Patent and Trademark Office (USPTO), located in Alexandria, Virginia, plans to replace the existing Wifi4/5 implementation with a Wifi6/Wifi6e capable solution. The current hardware has reached its end of life and must be replaced. The new wireless network will be deployed across the USPTO Alexandria campus and to the remote sites in San Jose, California; Denver, Colorado; Dallas, Texas; and Detroit, Michigan. The estimated square footage for current USPTO space is 2.6 million square feet with approximately 1,200 Access Points deployed.

2 Purpose

The purpose of this contract is to acquire a vendor solution that provides a new wireless solution for the USPTO Public and Enterprise Wireless Local Area Network version 2 (PEWLAN2) to replace existing PEWLAN. Wireless is provided as a productivity enhancer for mobile staffs, contractors, and guests at USPTO facilities. The new system shall provide secure network connectivity from anywhere within USPTO's space as an alternative to a wired connection. It shall also provide simple flexibility for cube-sharing, hoteling, and other situations where staffs move around frequently. PEWLAN2 will support USPTO executives, managers, and staffs while they are present on campus and will provide network access such that staffs may stay in touch during their busy schedules over this wireless network. PEWLAN2 will also be valuable for providing secure connectivity to guests including consultants, auditors, and other temporary staffs.

3 Scope

The USPTO is seeking a wireless solution that provides a Wifi6 solution with the capability to enhance to Wifi6e in all USPTO campuses areas or just in certain high-density locations and/or executive locations depending on cost. The system should provide the ability to run multiple SSIDs with different access levels including guest with Internet only as well as full enterprise level network access to the internal USPTO LAN. The system shall at a minimum Wifi6 on 2.4. GHz and 5 GHz. If the vendor is proposing Wiif6e access points in whole or in part, they should support 2.4 GHz, 5 GHz, and 6 GHZ radio according to IEEE 802.11ax and IEEE 802.11ax Amendment 1. The solution proposed should be able to deploy on a POE+ only local network for Wifi6 with the understanding that Wifi6e may require new switching devices in the future to support features or functions that require POE++. USPTO will focus on deployment in the two main buildings but depending on options and pricing, may choose to exercise some, all or none of the desired items now or in the future.

4 Requirement Specifications

The proposed solution shall include all software, hardware, accessories, licenses and warranty maintenance support required to meet the USPTO requirements for a new Wifi6/6e solution. The proposal should also include a professional services line item to support the training, initial

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configuration, set up, and systems migration strategy in conjunction with the USPTO support staff for the Base Year and Option Year 1. Detailed requirement specifications are presented in the following tables for establishing USPTO's PEWLAN2 solution for USPTO office space. Requirements are identified as either Mandatory, Highly Desirable, or Desirable. Offerors will be evaluated on how well the vendor's solution meets the Mandatory requirements and exceeds functionality by their ability to meet the non-mandatory requirements. Total solution cost will also be part of the evaluation criteria.

4.1 Mandatory and Preferred Requirements

4.1.1 Wireless Coverage and Coverage Locations Requirements

Requirements for Wireless Coverage and Coverage Locations are found in Table 1 below.

Table 1: Wireless Coverage and Coverage Locations Requirements

Req #	Wireless Coverage and Coverage Locations	Requirement
4.1.1.1	Offeror's wireless solution must be scalable using a modular approach to adjacent and nearby USPTO-defined locations as coverage requirements are defined	Mandatory
4.1.1.2	Offeror's solution must provide 802.11ax wireless service for accessing the Internet to enable expedient, on-demand wireless network connectivity	Mandatory
4.1.1.3	Offeror's solution shall be capable of utilizing OFDMA technology: • 256 subcarriers • 12.8 microseconds symbol duration	Mandatory
4.1.1.4	Offer's solution shall utilize Artificial Intelligence and Machine Learning to manage the reduction of interference and dynamically assess where AP's require additional capacity based on user load	Highly Desirable
4.1.1.5	The wireless solution shall have AI driven interference-handling techniques increasing airtime efficiencies	Desirable
4.1.1.6	The solution shall provide WiFi6 coverage and support the USTPO's customer base with wireless connectivity operating in a mixed wireless (Wi-Fi 4, 5,6, 6E) environment without degradation of wireless connectivity services	Mandatory
4.1.1.7	The solution shall provide WiFi6 coverage, with signal strength adjustable from minimum to maximum, for all government deemed common areas without degradation of wireless services	Mandatory
4.1.1.8	The offeror's WiFi6 coverage shall be provided for all personnel workspaces, offices, conference rooms, auditoriums, and lecture halls.	Mandatory

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Req #	Wireless Coverage and Coverage Locations	Requirement
4.1.1.9	The WiFi6 solution shall provide the USPTO with topographical views graphically showing WLAN coverage areas	Mandatory

4.1.2 Wireless Technology Product Requirements

Product Requirements for Wireless Technology are found in Table 2 below.

Table 2: 4.1.2 Wireless Technology Product Requirements

Req #	Wireless Technology Requirements	Requirement
4.1.2.1	The wireless solution shall provide WiFi6 based wireless service to enable wireless access to IT systems from a WiFi6 capable user device	Mandatory
4.1.2.2	Solution shall provide WiFi6e based wireless service to enable wireless access to IT systems from a WiFi6e capable user device	Desirable
4.1.2.3	Wireless access points shall be capable of running Wifi6 using existing POE+ network switches	Mandatory
4.1.2.4	Wifi6e access points shall be capable of running Wifi6e using existing POE+, even if that means enabling fewer radios.	Desirable
4.1.2.5	Any proposed Wifi6e access points (6 GHz spectrum) shall be capable of running full radios utilizing POE++ (IEEE 802.3bt standard)	Mandatory
4.1.2.6	WiFi6 access points shall be backwards compatible with supporting legacy WiFi technology (802.11a/b/g/n/ac)	Mandatory
4.1.2.7	WiFi6 access points shall be capable of meeting the performance standards of the IEEE Standards 802.11ax	Mandatory
4.1.2.8	The wireless solution shall provide WiFi6 technology which is scalable and supports on-premises or cloud deployment solutions	Mandatory
4.1.2.9	The wireless technology shall be able to support expansion in increments that align with a comprehensive wireless architecture for the complete indoor or outdoor solution where required	Mandatory
4.1.2.10	Support point-to-point, hub-and-spoke and/or mesh wireless connectivity solutions as needed to support a broad range of wireless connectivity needs	Mandatory
4.1.2.11	The offeror's solution shall be capable of supporting WiFi 6E wireless connectivity technologies in the future in the event that the government chooses to exercise the WiFi 6E option in whole or partial increments in the future.	Mandatory
4.1.2.12	The solution shall utilize wireless hardware that is tunable by an administrator or via hardware replacement to retain flexibility for future channel changes/reallocations.	Mandatory

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Req #	Wireless Technology Requirements	Requirement
4.1.2.13	The wireless system shall support autonomous or manual interference mitigation techniques to isolate wireless mobile devices from local RF interference.	Mandatory
4.1.2.14	The wireless solution shall support Multi-Radio WLAN Access Points (APs) to increase the maximum number of concurrent users for a given installed AP.	Mandatory
4.1.2.15	Offeror solution shall be able to provide access points that support 6Ghz, 5 GHz, and 2.4 GHz-based WLAN technologies where USPTO deems necessary	Mandatory
4.1.2.16	The offeror's solution shall provide support for 802.11b/g/n/a/an/ac/ax technology operating on the WiFi6 solution which shall be capable of isolating legacy WiFi technologies (802.11b/g/gn/n) into their own unique WLAN in order to maximize the performance of each variant and further to prevent slow legacy variants (e.g., 802.11g) from interfering with high performance modern variants operating on the same WLAN (e.g., 802.11ax)	Mandatory
4.1.2.17	The wireless solution shall be capable of running in a dual stack IPv4 and IPv6 configuration and also be capable of running IPv6 only for all system and user functionality	Mandatory
4.1.2.18	The solution shall support all standards-based network protocols. No proprietary configuration or protocols should be required for the USPTO wireless system to function. If proprietary configuration or protocols are required, the offeror shall detail the reason for deviation from standards-based protocols	Mandatory
4.1.2.19	The wireless solution shall have the capability to support real-time WiFi positioning for devices within 10 meters of accuracy, with no additional hardware required.	Mandatory
4.1.2.20	The wireless solution shall have the capability to use advanced positioning technology such as Bluetooth Low Energy (BLE), within 5 meters of location accuracy, for more accurate location services. Offeror should identify the accuracy of their advanced positioning technology.	Highly Desirable
4.1.2.21	The wireless solution management, maintenance and operation shall be friendly-users and simple with minimum trainings.	Highly Desirable

4.1.3 Power and AP Radiated Power Requirements

Requirements for Power and AP Radiated Power are found in Table 3 below.

Table 3: Power and AP Radiated Power Requirements

Req #	Power and AP Radiated Power Requirements	Requirement
4.1.3.1	The solution shall support utilization of POE+ and PoE++ WLAN AP's technologies to simplify and reduce the cost of wireless device installation and support	Mandatory

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Req #	Power and AP Radiated Power Requirements	Requirement
4.1.3.2	If switches are included in the offeror's proposed solution (but not required), they will be capable of providing PoE++ power (IEEE 802.3bt standard) in order to support WiFi6E power requirements with backwards compatibility with legacy WiFi technologies to support legacy PoE+ wireless edge hardware	Mandatory
4.1.3.3	If switches are included in the offeror's solution (but not required), for access point connectivity, they will be capable of providing ports speeds for access point connectivity of 1Gbps, 2.5 Gbps, and 5 Gbps.	Mandatory
4.1.3.4	If switches are included in the offeror's solution (but not required), for access point connectivity, they will be capable of providing multiple 10Gbps ports for upstream network connectivity	Mandatory
4.1.3.5	The radiated power from an AP shall have a monitoring capability and be capable of being administratively restricted via manual and automatic means	Mandatory
4.1.3.6	Outdoor mounted access points and antennas and accessories/mount brackets must be outdoors rated and use National Electrical Manufacturer Association (NEMA) -compliant enclosures	Mandatory
4.1.3.7	Outdoor mounted antennas should be appropriate for the required area of coverage. For example, an omnidirectional antenna should be used in an open area where coverage is required in all 360-degrees and panel or sector antennas should be used when directional propagation is required	Mandatory
4.1.3.8	USPTO building locations host a varied number of employee technologies which may interfere or reflect RF signals (Bluetooth, microwaves). The offeror's solution shall have the capability to identify and mitigate signal interference	Mandatory

4.1.4 Wireless Performance Requirements

Requirements for Wireless Performance are found in Table 4 below.

Table 4: Wireless Performance Requirements

Req #	Wireless Performance Requirements	Requirement
4.1.4.1	The offeror's solution shall provide robust, reliable, pervasive 802.11ax coverage	Mandatory
4.1.4.2	The 802.11ax wireless network shall meet the following minimum performance specifications: • Has a ping latency to the nearest wired gateway/router of no greater than 10 milliseconds (ms). • Fault tolerant coverage with no single point of failure	Mandatory

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Req #	Wireless Performance Requirements	Requirement
4.1.4.3	The solution shall provide an administrative capability to configure minimum connection speed or minimum signal strength to control wireless LAN performance	Mandatory
4.1.4.4	Dedicated band/channel for wireless backhaul with a minimum connection speed of 1 Gbps and a Signal to Noise Ratio (SNR) of at least 30 dB to maximize throughput and minimize latency over backhaul link	Mandatory
4.1.4.5	The solution shall provide 802.11 wireless performance monitoring for utilization, transmission fault, packet loss, jitter, and interference, at a minimum, to maintain a high level of WLAN performance at all times	Mandatory
4.1.4.6	The wireless solution shall support at least 1,000 USPTO guest users and at least 24,000 guest mobile devices across the entire USPTO installation coverage area where WiFi 6 service is provided.	Mandatory
4.1.4.7	The solution shall provide dynamic guest licensing model that allows for reuse of guest licenses	Mandatory
4.1.4.8	Wireless guest access must allow application of policies to provide different levels of privileged access	Mandatory

4.1.5 Wireless Security Requirements

Requirements for Wireless Security are found in Table 5 below.

Table 5: Wireless Security Requirements

Req #	Wireless Security Requirements	Requirement
4.1.5.1	The solution shall provide an administrative capability to configure band blocking to address local security concerns	Mandatory
4.1.5.2	The solution shall provide an administrative capability to configure channel blocking to address local security concerns	Mandatory
4.1.5.3	The solution shall provide an administrative capability to configure power control to address local security concerns or interference management	Mandatory
4.1.5.4	The solution shall provide administrative wireless authentication/encryption controls (WPA3) to prevent use of vulnerable wireless security protocols	Mandatory
4.1.5.5	The solution shall also provide support for authentication/encryption controls using WPA2	Mandatory
4.1.5.6	The offeror's solution shall enable USPTO to comply with CISA Security Tip (ST18-003) on Securing Wireless Networks (https://www.cisa.gov/tips/st18-003). Note – With the exception, that the solution must be only FIPS 140-2 validated by NIST. FIPS 140-3 is not required at this time.	Mandatory

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Req #	Wireless Security Requirements	Requirement
4.1.5.7	The wireless solution shall support the use of 802.1x radius authentication using USPTO's Cisco Identity Services Engine	Mandatory
4.1.5.8	If the wireless solution proposed has any cloud-based systems or supporting functionality, it must be FedRAMP certified. Note – If not FedRAMP at time of award, then all components must be deployed on-premises until such time as a FedRAMP certified solution is available with a seamless migration.	Mandatory
4.1.5.9	Any components proposed in the wireless solution that perform encryption or decryption must be FIPS 140-2 certified	Mandatory
4.1.5.10	The wireless solution shall support quality of service settings to ensure critical applications such as voice and video can be prioritized over the wireless network and be passed to the wired network to support prioritization of traffic on the LAN	Mandatory
4.1.5.11	The wireless solution shall be able to provide a captive portal for guest users to register for a wireless account	Mandatory

4.1.6 Management And Orchestration Requirements

Requirements for Management and Orchestration are found in Table 6 below.

Table 6: Management and Orchestration Requirements

Req #	Management and Orchestration Requirements	Requirement
4.1.6.1	The solution shall provide a single management/orchestration system for all wired and wireless system components	Desirable
4.1.6.2	The solution shall support deployed elements which require management/orchestration for a multivendor environment	Desirable
4.1.6.3	The solution shall allow for user IoT device roaming seamlessly between AP's that may not configured with the specific wireless users SSID. The system shall have the capability of dynamically configuring its self while not interrupting the users service or diminishing the users quality of service.	Desirable
4.1.6.4	The solution shall support seamless roaming between Access Points at layer 2 without service degradation	Mandatory
4.1.6.5	The solution shall support seamless roaming between Access Points at layer 3	Highly Desirable
4.1.6.6	The Central Management for the wireless system shall provide system visibility as a "single pane of glass."	Mandatory
4.1.6.7	The Central Management for the wireless system shall be capable of providing centralized Policy Management	Mandatory
4.1.6.8	The Central Management for the wireless system shall be capable of providing centralized Policy Administration	Mandatory

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Req #	Management and Orchestration Requirements	Requirement
4.1.6.9	The Central Management for the wireless system shall be capable of remotely performing operating system and other critical software patches on appliances.	Mandatory
4.1.6.10	The Central Management for the wireless system shall be capable of remotely performing system configuration and policy changes on the access points and, if applicable, to the wireless gateway/controllers	Mandatory
4.1.6.11	The wireless system shall support the ability to upgrade individual system components without downtime. Including: • The ability to upgrade selective access points per floor or building such that other access points automatically increase their coverage areas as needed to support users. • The ability, if applicable, to upgrade gateways/controllers without an outage to the USPTO wireless network. • The ability for the management/orchestration system to be upgraded without downtime for the USPTO wireless network.	Mandatory
4.1.6.12	The wireless system shall have the ability to detect precisely rogue access points along with the ability to contain precisely the rogues access point (such as Time-of-Flight or Wifi Round-Trip-Time) and the ability to mark the discovered access point as known or "friendly" device, at real-time.	Mandatory
4.1.6.13	The wireless management system shall have the ability for USPTO to import floor plans, place access points on the floor plan, and depict heat maps.	Mandatory
4.1.6.14	The wireless management system shall have the ability to place access points automatically and dynamically on the imported floor plans	Desirable
4.1.6.15	The wireless management system shall have the ability to schedule the availability of configured SSIDs to specific hours as defined by USPTO	Mandatory
4.1.6.16	The system shall have ability to schedule one or more SSIDs to be available during specific alternate times on specific floors or in specific buildings	Mandatory
4.1.6.17	The offeror shall document all the end of sale, end of new software support, end of software bug fixes, end of hardware support, and end of life support for all proposed hardware and software and must meet a minimum of 5 years before end of all support from date of purchase	Mandatory
4.1.6.18	The wireless solution will have the friendly-user capability to run packet captures on the access points for specific users for troubleshooting	Mandatory
4.1.6.19	The wireless solution shall have the ability to send all logging to USPTO SIEM tools	Mandatory
4.1.6.20	The wireless solution shall maintain a minimum of 90 days of historical data with the ability, by advance government request, to store 1 year of data at a minimum	Mandatory

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4.1.7 Coverage Areas

Requirements for Coverage Areas are found in Table 7 below.

Table 7: USPTO Building Details and Locations

Location	Current AP Count	Number of Floors	Approximate Square Footage	Notes
Madison East	174	11	445,360	600 Dulany St, Alexandria, VA 22314
Madison West	174	11	447,792	600 Dulany St, Alexandria, VA 22314
Jefferson	150	11	354,088	500 Dulany St, Alexandria, VA 22314
Knox	144	11	354,872	501 Dulany St, Alexandria, VA 22314
Randolph	150	11	376,995	401 Dulany St, Alexandria, VA 22314
Remsen	144	11	376,995	400 Dulany Sr, Alexandria, VA 22314
Carlyle TH	26	3	29,169	501 John Carlyle St, Alexandria, VA 22314
Elizabeth TH	35	5	48,614	550 Elizabeth Ln, Alexandria, VA 22314
Detroit, MI	24	1	45,000	300 River Place Dr, # 2900 Detroit, MI 48207
Dallas, TX	20	2	40,000	207 South Houston St., # 159 Dallas, Texas 75202
Denver, CO	19	2	46,000	1961 Stout Street 14th floor Denver, CO 80294
San Jose, CA	14	3	35,000	26 S. Fourth St San Jose, CA 95112

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4.1.8 User Density Requirements

Requirements for User Density are found in Table 8 below. Sample heatmaps from the current USPTO wireless deployment of a typical office floor in Alexandria, VA are provided in Figures 1 and 2.

Table 8: Estimated User Density in USPTO Spaces

Area Percentage	Density	Users Per Access Points
15%	High	Up to 1000 Users (Cafeteria/ Auditoriums/Conference Center)
80%	Medium	200-250 (Office Buildings/users per floor)
5%	Low	25 or less Users (hallways, common areas)

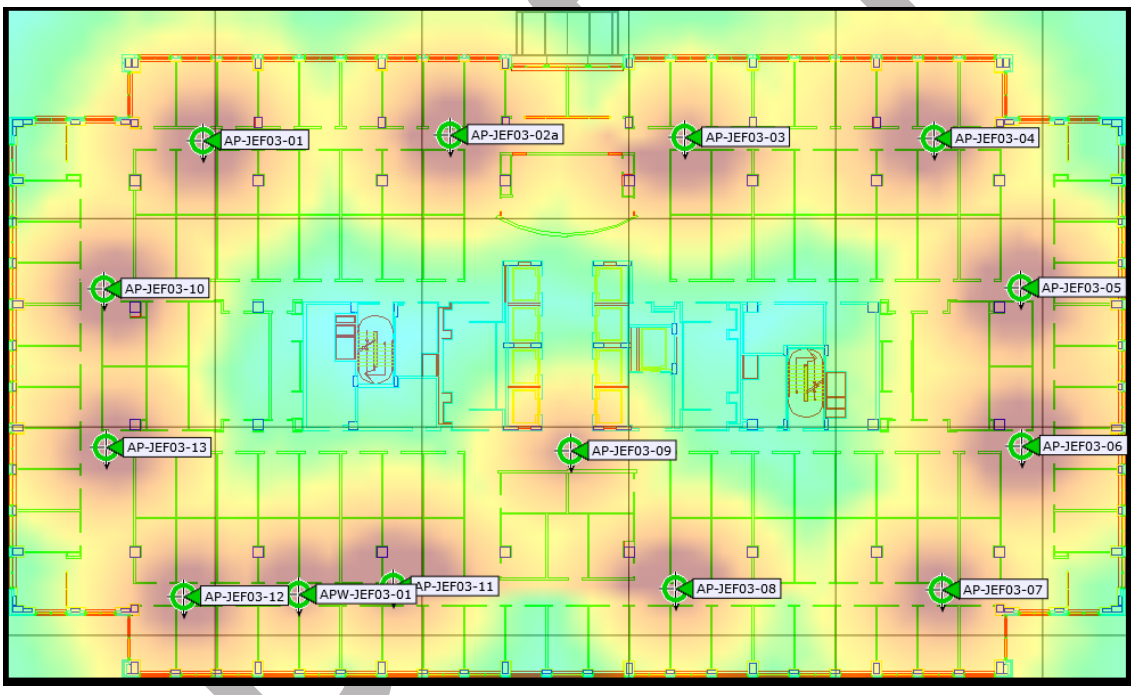


Figure 1 - Sample heat map from USPTO Jefferson building (3rd Floor) located in Alexandria, VA

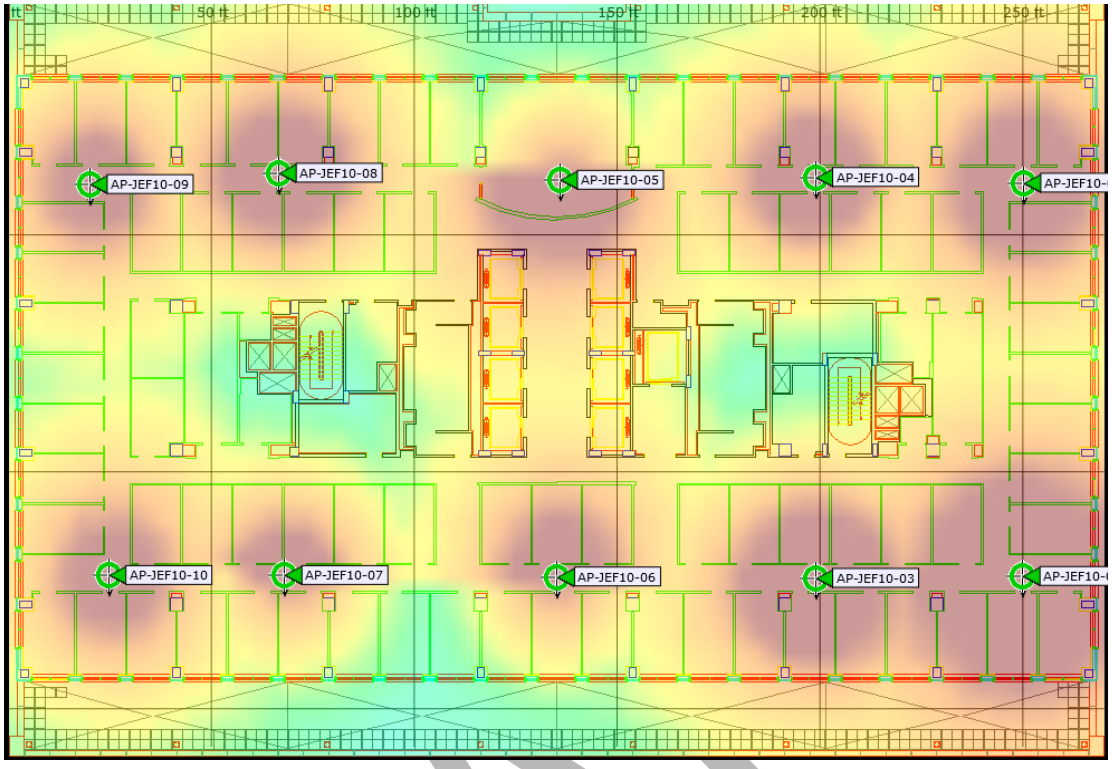


Figure 2 - Sample heat map from Jefferson building (10rd Floor) located in Alexandria, VA

4.1.9 USPTO Asset Tracking Integration – Optional

USPTO is also looking for recommendations or available technology to combine asset tracking into the new Wifi6/6e solution if possible. The current USPTO asset tracking system is based on an Impinj RAIN asset tagging and Aware Innovations solution. The solution allows assets to be tracked as they move in and out of USPTO buildings. The offeror is requested to optionally propose either a method to integrate the current Impinj system into the proposed Wifi6/6e replacement system if possible or propose an alternative solution for asset tracking that could be used with the new Wifi6/6e solution in the future.

4.2 Optional Services

The contract option years may include CLIN line items for increasing the number of access points and required licenses. Optional hardware and services may be procured in the Option years to support the USPTO wireless deployment. Additionally, vendor professional support service hours may be procured to assist USPTO with deployment of the wireless network solution.

4.3 License and maintenance fees

The proposed solution and cost should include reoccurring license, software and hardware fees along with fees for vendor problem support. Support should be for 8x5 call in and ticket support with return to factory replacement (if applicable) with the option for the offeror to propose 24x7 support with next day RMA hardware replacement.

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4.4 Training

The proposed solution should include up to 40 hours of Specialized Product Training for up to 20 USPTO Staff. The Training should cover daily administrative operations, policy creations, system feature set up and system administration maintenance and upgrade activities. Training can be onsite in USPTO training rooms or virtual if needed.

4.5 Professional Services

Vendor Professional services should be priced separately if not included with the hardware and software system pricing. Vendor-designated professional services personnel will not be required to go through the USPTO security check and badging process and will be allowed on site with appropriate government supervision/escort. Professional service can include, but is not limited to assist USPTO personnel with:

1. Support services for designing the wireless network connectivity to the USPTO network
2. Support services for initial wireless installation and setup
3. Support services for setting up the central management for the new wireless local area network and if applicable, set up of any gateway/controllers needed.
4. Support services for testing wireless access during the initial set up as needed
5. Delivery of artifacts, activities and recommendations as detailed in Section 7, below

5 High Level System Architecture

USPTO plans to deploy a new Wifi6/6e network to replace the end-of-life wireless network deployed in 2011. The management console solution will be operated either physically onsite out of one of USPTO physical datacenters and/or within the cloud. The vendor should propose their best value wireless solution possible whether that includes or does not include wireless gateways/controllers.

USPTO will most likely deploy the new wireless systems in phases with the Alexandria Madison East and Madison West buildings as first priority. Even though Wifi6e capable access points are desired, the initial deployment will only enable Wifi6 on 2.4 and 5 GHz radios. Unless the vendor solution provides for new access switches for the wireless network only that provide POE++ (802.3bt) and multigigabit port capabilities, USPTO will not enable Wifi6e until a future time when those capabilities can be provided. In addition, Wifi6e will be a future enhancement after USPTO can conduct a survey and plan for installation of Cat6a cabling or better for those access points.

6 Administrative Requirements

The Vendor/Contractor shall attend a Kick-Off meeting with the Contracting Officer (CO), the Contracting Representative (COR), Technical Lead (TL) and Task Order Manager (TOM) no later than ten (10) business days after the date of award. The purpose of the Kick-Off meeting is to discuss technical and support task objectives of the task order.

7 Deliverables

SOW Section	Deliverable	Due Date	Delivery Method
6.0	Kick Off Meeting	Within two weeks of award	Virtual remote meeting with

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SOW Section	Deliverable	Due Date	Delivery Method
			CO/COR
4.1	All software, hardware, and license required to implement wireless in the required locations	Within 30 days of award for software and licenses Within 60 days of award for hardware for each Option Period	Electronically to COR for Software Delivered to USPTO Warehouse and COR is notified for hardware
4.5	Support services for design and installation	As scheduled by the Technical Lead	On site as required or via MS Teams, as required with government supervision
4.5	Configuration support for initial set up	As scheduled by the Technical Lead	On site as required or via MS Teams, as required with government supervision
4.5	Training	As scheduled by the Technical Lead	On site as required or via MS Teams, as required with government supervision
4.5	(Optional) Monitoring and Analysis for Best Practice Use	As scheduled by the Technical Lead	Via evaluation report deliverable

8 Period of Performance

The base period of performance is 12 months from the date of award (Targeted for Q4 FY22), with one twelve-month option period.

Base Period: Twelve months from the date of award.
Option Period 1: Twelve months from the end of the base period.

9 Place of Performance

All work related to this contract shall be performed in the Continental United States at either the USPTO's campus in Alexandria Virginia, the Contractors' and subcontractors' facilities authorized in the USPTO granted ATO, and/or from USPTO approved telework locations. Work at any other location is prohibited unless dually authorized by the CO and System co-AOs (Authorizing Officials of the ATO).

Note: Alternate, specific system and site access can be determined in the future.

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10 Special Requirements (If Applicable)

Compliance

- The contractor shall be responsible for safeguarding all Government equipment, information and property provided for contractor use. At the close of each work period, government facilities, equipment, and materials shall be secured. Send completed forms to designated Point of Contact.

- The contractor shall not disclose and must safeguard procurement sensitive information, computer systems and data, Privacy Act data, and government personnel work products which are obtained or generated in the performance of this contract. This includes dissemination of protocols and papers not generally available through the public literature.

Cloud Based wireless management solutions are preferred and must be FedRAMP'ed. Solutions will be rated on how soon a FedRAMP'ed service can be provided, if one is not ready at time of Award. (or by October 2022)

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