UW-IT Wi-Fi Services Requirements Guide:
POST-INSTALLATION SURVEYS
UW Facilities - Section 27 17 53 Wireless Communications

CONTENT

OVERVIEW - UW-IT Wireless Services and Mobile Communications Requirements Guides

All UW projects for new construction and space renovations of 50,000 sq ft or more must incorporate the design and installation of the following Wireless and Mobile Communications Services:

WI-FI SERVICE - Service managed and operated by UW-IT Wireless Services Team.

PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM (“PS DAS”) - Service managed and operated by EH&S with UW-IT Mobile Communications Team consulting.

CELLULAR DISTRIBUTED ANTENNA SYSTEM (“Cellular DAS”) - Service managed and operated by cellular carrier with UW-IT Mobile Communications Team consulting.

The following collection of requirements guides should help project participants better understand these services and how UW-IT Wireless Services and Mobile Communications teams are engaged and integrated into the overall project. While all guides should be helpful for the Project Manager, some are geared toward specific teams.

UW-IT Wi-Fi Services Requirements Guide: Project Management

- Provides the UW Project Manager with information to help integrate the design and deployment of UW-IT Wi-Fi Services into the project plan.

UW-IT Wi-Fi Services Requirements Guide: Architecture and Engineering Designs

- Provides the Wi-Fi Design Engineer with information needed to create and deliver a Wi-Fi service design.

UW-IT Wi-Fi Services Requirements Guide: Service Installations

- Provides the Wi-Fi service installation team with information needed to install a UW-IT Wi-Fi service based on the final pre-installation design.

UW-IT Wi-Fi Services Requirements Guide: Post-Installation Surveys

- Provides the Wi-Fi post-installation survey team with information needed to test the installed UW-IT Wi-Fi service to ensure it meets service standards and all vetted service requirements.

UW-IT Requirements Guide: Public Safety Distributed Antenna Systems (Public Safety DAS)

- Provides EH&S and the Project Manager with information needed for the inclusion of a Public Safety DAS.

UW-IT Requirements Guide: Cellular Distributed Antenna Systems (Cellular DAS)

- Provides the Project Manager with information needed for the inclusion of a Cellular DAS.

REQUIREMENTS

R1 - Required UW-IT Wireless Services and Mobile Communications Change Reviews and Approvals

Once service requirements have been collected and the service design process starts, any subsequent changes with the potential to impact the service requires review and advanced approval by the appropriate UW-IT service team before incorporation in the design and service implementation.

Service quality can be affected by many environmental and use-specific factors, all of which are considered in the service design process. Proposed changes to these factors - inclusive of customer requirements - after the onset of the design work will be reviewed by the UW-IT Wireless Services team or Mobile Communications team, as appropriate, and considered in the context of the overall design. Some of the many factors considered in the design include the following:

- architecture (e.g., new room, change in wall location, stairwells, elevators, etc.);
- environment (e.g., building materials, furniture, cabling);
- space type (e.g., office space, lab, auditorium);
- people using the service (e.g., students, medical staff, researchers, guests);
- devices (other than laptops, tables, and phones) using the service (e.g., cameras, freezers);
- apps using the service (e.g., Wayfinder);
- density of devices by location (e.g., 50 devices in small room vs 2 devices in large room);
- use profiles in each location (e.g., sporadic video streaming; students in large lecture hall simultaneously accessing Internet sites; big data uploads/downloads);
- appropriate RF frequencies;
- target delivery dates and project delays of six or more months which may require updates to equipment and equipment costs.

The UW-IT service teams appreciate your cooperative communication throughout the project regarding changes that have the potential to impact the resulting quality and delivery of the services.

R2 - UW-IT Wireless Services and Mobile Communications Project-Related Communications and Coordination

Collaboration Space and Document Sharing. At the outset of each project, a UW-IT Partner Project Services team member will create a dedicated online shared-access space where project-related information and documents can be accessed and managed by project team members. Documents in this space will include materials from the project's architecture team; UW-IT forms related to service requirements and installation details; the service design package; and more as needed.

Meetings. Project team members are required to attend various meetings relevant to their roles and project coordination efforts. These meetings may include one or

more on-site walkthroughs; pre-design requirements identification; post-installation review; and regular (usually weekly) project team meetings. Meetings may be called by the Project Manager, the UW-IT Partner Project Services team member, or other project team members. Each participating project team – UW teams and third–party contractors – must ensure that an appropriate team member and/or leader attend all required meetings. The designated meeting attendees will be informed and up to date on the status of their team's responsibilities and work.

Professional and Timely Communications. Each project participant is responsible for appropriate and timely communications via email, document sharing, ticket systems, etc. If in doubt as to who to contact, send email to help@uw.edu and specify the project name in the subject line.

R3 – Post-Installation Survey General Requirements

A. AP Readiness and Survey Timing: Before a survey is requested, the Wireless Services team will confirm that all AP's are up and functional. The survey will occur at least 2 days after the AP's have been installed.
B. Survey Kit: Use only the survey kit provided by the UW-IT Wireless Services team.
C. Site Survey Utility: Site surveys will be conducted using the version of Ekahau Site Survey (ESS) and survey template specified by the UW-IT Wireless Services team. (Template pending as of August 2024; request information from Wi-Fi Program Coordinator.)
D. Floor Plans: Use the designated UW "clean" floor plan files for conducting the Ekahau Site Survey. Do not use the initial predictive survey file.
E. The UW-IT default Ekahau project template has incorporated UW-IT standard settings and metrics for surveys. (Template pending as of August 2024; contact Wi-Fi Program Coordinator for information.) Use the project-specific form for the survey and follow this filename convention for the post-installation survey file:

[FACCODE]-[FACNAME]-[FACNUM]-[EK | HA] - [*Full* | *Area*] -YYYYMMDD

Note: for final survey v# = vFINAL
FACCODE = Facilities code for the building (e.g., SUZ)
FACNAME = Building Name (e.g, Suzzallo Library)
FACNUM= Facilities number for the building (e.g., 1193)
Survey type:
EK = Ekahau
HA = Hamina
Survey Coverage:
Full = Entire project area, provide a descriptor
Area = named portion of the project area, provide a descriptor
Date must be provided in this format: YYYYMMDD

Examples:
SUZ – Suzzallo Library – 1193 – EK – Full Floors1-3 – 20240101
SUZ – Suzzallo Library – 1193 – EK – Area Rare Books Suite – 20240101

F. Confirm scale of the floor plan: Once on site, confirm the scale of the electronic floor plan using the range finder, preferably on the longest measurement possible e.g., a straight-shot, long hallway. Do not rely on door openings to confirm scale.
   1) If scale is NOT correct, use the Ekahau app 'note' function to report the discrepancies and anomalies. Be sure these are called out clearly in the final report.

G. Required UW-IT Settings for the Ekahau Survey:
   1) The devices will use the UW MPSK SSID for the survey work.
   2) All surveys will be 'passive' and include a spectrum analysis.
   3) Surveys will assess primary and secondary signal strengths in all bands. For effective service, there should be no service location with a primary or secondary signal less than –67 dBm.
   4) Survey mode type: always use "Continuous" mode and NOT "AutoPilot" or "Stop and Go". "Continuous" mode depends on Sidekick2 location markers to track the accurate path on the floorplan as well as the locations of the APs. Location markers are set using button pushes, taps or clicks (as appropriate) at each of the following points: survey start, where direction changes, and survey end.
   5) All UW APs, including those installed as part of project, will be placed on the survey by ESS. The surveyor will stop directly underneath each AP, select the stop button, pause, and then the start button to continue walking.
   6) A survey segment is a partial survey with multiple start/stop points. For large projects (full floors and/or multiple floors), survey multiple segments of logical and roughly equal areas. If problematic data is found following the survey, then only the problematic segment will need to be redone.
   7) The Ekahau application will be preconfigured with a survey template that reflects the Wireless Services appropriate survey settings. (Template pending as of Aug 2024; request information from Wi-Fi Program Coordinator.) Generally, settings are found on the "Project" tab and then by selecting "Coverage Requirements."
   8) The "Coverage Area" tools will be used to outline the actual expected coverage area and to avoid adding any extra white space outside of the coverage area.
   9) The "High Capacity Area" tool must be used to define the areas where there is high user density such as auditoriums and cafeterias.
   10) Default design settings will include the following. These should not be changed.
      a) Minimum Signal Strength - Min -62 dBm

b) Signal-to-noise Ratio – Min 35 dB
c) Data rate minimum – Min 12 mbps
d) Number of Access Points - Min 2 at min. -67 dBm
e) Channel Interference – Max 4 at min. -80 dBm
f) Round Trip Time – Max 200 ms
g) Packet Loss – Max 2%
h) Use Noise From: Measured Noise
i) Network Load: Moderate – 10%
j) Adapter: Raw Measurements

H. Walk path requirements:
1) Ideally a location survey will be done during one site visit. If one site visit is insufficient, minimize the number of visits and complete them in as compact a timeframe as possible.
2) Each time you select 'stop' on a survey walk, the data is saved to the cloud; ensuring the data is saved is essential for completing an accurate survey. When in survey mode, the app does not display survey results.
3) Unless otherwise noted, it is assumed that all surveys are completed with the Sidekick2 at roughly 36" above the floor.
4) When performing the actual survey, keep a consistent pace; click at every direction change and beneath each AP and as otherwise directed in these requirements to ensure accurate data.
5) Marker selections (data point clicks) need to be represented on the floorplan. E.g., if furniture prevents walking next to the wall, then the data points/clicks on the floorplan need to be made roughly where the surveyor is standing/walking relative to the wall and not at the wall.
6) The survey must include all areas where coverage is required and ensure that appropriate samples are taken from each area.
a) Corridors: the survey technician must walk and record on both sides of the corridor.
b) In a small- or medium-sized office, the survey sample must be taken at the furthest point from the room's entrance along with a sample at the entrance of the room or office. Be sure the interior path completes a 'loop' in the room.
c) When surveying larger rooms and open space areas the surveyor will walk the perimeter keeping as close to the walls as possible, taking one sample at each corner. Next, walk multiple paths wall to wall with no more than 10' between these cross-sectional survey paths to ensure full data coverage of the space.

7) As the walk is completed, tap to stop at any locations where there are any anomalies that need to be noted. Once you've made the notation, tap to start again.

I. When the survey is completed, generate a survey report using the template and save the file in the project collaboration space using the following naming

convention. (NOTE: template pending as of August 2024; request information from the Wi-Fi Program Coordinator.)

[FACCODE]-[FACNAME]-[FACNUM]-[EK | HA] - REPORT - v# - YYYYMMDD

Note: for final report v# = vFINAL
FACCODE = Facilities code for the building (e.g., SUZ)
FACNAME = Building Name (e.g, Suzzallo Library)
FACNUM= Facilities number for the building (e.g., 1193)
Survey Type:
EK = Ekahau
HA = Hamina
Date must be provided in this format: YYYYMMDD

Examples:
SUZ – Suzzallo Library – 1193 – EK – Report - v1 – 20240101
SUZ – Suzzallo Library – 1193 – EK – Report - vFINAL – 20240101

The report template will include sections below. (Template pending as of August 2024; request information from Wi-Fi Program Coordinator.)

i. Location information: building, floor, rooms
ii. Date and time of survey.
iii. Note and report survey conditions:
    a. Scale of Wi-Fi network activity – known devices/apps using the network
    b. Scale of Wi-Fi network activity - known devices/apps using the network
    c. Density of persons in the area
    d. Any on-going construction locations or areas without final furniture
    e. Other sources of interference
    f. Other noteworthy observations as appropriate.

J. The completed Ekahau Site Survey (ESS) report must include all surveyed floors for a building with the floors properly aligned. This will include the following:
    1) DWG file reflecting all AP placement locations.
    2) Walk Path report
    3) Heat Map
    4) Identification of channel overlap issues/areas
    5) Identification of interference issues/areas
    6) Identification of concerning signal-to-noise ratio (SNR) areas

K. An additional written synopsis (in MS Word) of post-installation survey is required to document conditions, identifying any issues or data requiring review. Recommendations for dealing with deficiencies should also be included.

PROCESS

P1 – Contractor Qualifications and Qualifications Submittals

The UW-IT Wireless Services team will be responsible for all post-installation surveys. Post-installation surveys may be completed by a UW-IT Wireless Services team member or UW-IT Wireless Services may opt to contract the work to a qualified third party. In the latter case, the Wireless Services team will be responsible for overseeing the work and contributions of the third party.

When contracting with a third party, UW-IT Wireless Services will ensure that the contractor meets the following requirements:

- The Contractor performing the post-installation survey work shall have demonstrated ability with the required equipment and applications specified and shall have been performing this work for at least five (5) years.
- Within the previous three years, the Contractor performing the work shall have successfully completed a minimum of five (5) similar wireless communications post-installation survey projects equal in magnitude (in terms of size and construction cost) and, for projects consisting of less than 35 access points, projects shall have been successfully integrated into a network consisting of no fewer than 400 access points.
- The Contractor will employ individuals who are familiar with and qualified to use the designated equipment and applications and can complete the post-installation surveys as described herein.
- Only full-time permanent employees of the Contractor shall perform the work.

Submittal of contractor qualifications must be provided not more than two weeks in advance of the installation project start date and not later than the onset of the work. As the details of these qualifications may change throughout the work (e.g., new contractor staff are brought in and others released), the contractor is responsible for providing timely updates to qualifications.

P2 - Input Materials, Information, Resources

- This guide;
- Post-installation design documentation;
- Relevant UW “clean” floorplan files of the area to be surveyed;
- UW-IT Wireless Services default Ekahau project report template with predefined survey configurations; (Template pending as of August 2024; request information from Wi-Fi Program Coordinator.)
- Survey kit including:

- Fully charged Ekahau Sidekick2 w/ its own Ekahau Connect ID/login (shared password and six-digit pin) which allows survey data to be stored in Ekahau Connect cloud and shared as appropriate
- Fully charged IPad w/ Ekahau survey software loaded
- Laser Range Finder

P3 - Output Materials, Information, Resources

- Iterative Survey Files (Ekahau files)
- Final Survey Report – generated from Ekahau and using file naming convention provided in R3 E. above.
- Written synopsis in MS Word format of post-installation survey documenting conditions, identifying any issues or data requiring additional review. Recommendations for dealing with deficiencies should also be included.

P4 - High-Level Service Delivery Process Stages

A. The Wireless Services team will coordinate with the Project Manager for an appropriate day/time to run the survey. Before a post-installation survey is requested, the following must be true:
   1) The APs have been installed and operational for two days prior to the survey;
   2) The APs will all be operational on the day of the survey;
   3) Furniture is in place.

B. The surveyor will request appropriate access including access cardkey and/or physical keys to enter all survey spaces. If no cardkey(s)/key(s) are available, then ensure there is an on-site contact (name and contact info) with whom to coordinate access. Depending on the location, this may also require escorted access.

C. Get the survey kit from the Wireless Services team:
   1) Ekahau Sidekick2;
   2) IPad w/ Ekahau software using the pre-configured UW-IT default survey settings as well as the appropriate UW floor plan installed for the survey site;
      a) Confirm access to the kit's shared Ekahau Connect account.
   3) Laser Range Finder for scale verification.

D. Based on the floor plan, outline an appropriate walk path in advance. It may require modifications once on site, but having a strategy will make it more efficient. See more about walk paths in Requirements R3.H above.

E. Once on site, begin the survey by confirming the scale of the electronic floor plan using the range finder preferably on the longest measurement possible e.g., a straight-shot, long hallway. Do not rely on door openings to confirm scale.
   1) If scale is NOT correct, use the Ekahau app 'note' function to report the discrepancies and anomalies. Be sure these are called out clearly in the final report.

F. Once scale is confirmed, verify appropriate survey settings and walk-paths, then complete the appropriate surveys. Ensure survey results are stored in Ekahau connect. See Walk Path Requirements in R3.I above.

G. Create the post-installation survey report using the provided report template and using the standard file naming convention as outlined in R3-I above. (Template pending as of August 2024; request information from the Wi-Fi Program Coordinator.) Inform the Wireless Services team that the report is ready. The Wireless Services team will compare survey results with the requirements as outlined in the design and as-builts, and inclusive of customer requirements for unique and non-standard uses (e.g., wi-fi exemption zones; density and/or capacity requirements; etc.)

H. Where installed services fall short of the requirements and service standards, the Wireless Services team may make modifications to the installation (either physical or configurations) and require a partial follow-up survey. Once the Wireless Services team deems that all survey results are acceptable, they will update the final design and as-builts to reflect the delivered service construct.

I. Deliver the final post-installation survey reports: a) Survey report generated through Ekahau using UW-IT provided template (Note: template pending as of August 2024; request information from Wi-Fi Program Coordinator) b) the ESS site survey document; and c) the narrative material in an MS Word document.

H. The Wi-Fi service will be transitioned for operational oversight. The customer will be informed that the Wi-Fi service installation is complete and ready to use.