

**SECTION 27 21 33
DATA COMMUNICATIONS WI-FI ACCESS POINTS**

PART 1 – GENERAL

1.1 SUMMARY

- A. This section specifies requirements for the design/layout, and installation of communications data outlets that are to serve IEEE 802.11 wireless access points (WAPs).

1.2 DESIGN REQUIREMENTS

- A. Coverage areas
 - 1. All building spaces shall have coverage for currently supported Wi-Fi standards (as of 6/2012 this includes 802.11a/g/n at a minimum SNR of 25dBm, but will include 802.11ac as soon as equipment is provided by vendors).
 - 2. Outdoor coverage around the exterior of the building shall be provided for all high-user areas and where practical in other areas.
 - a) Outdoor wireless coverage may require building exterior wall penetration, the mounting of antennas on the building exterior and underground pathways to strategic WAP outdoor mounting locations such as emergency call boxes and signs.
 - b) Coordinate with ITS during design for best indoor and outdoor locations.
- B. Density of communication outlets for WAPs
 - 1. Residence halls – one per 1600 gross square feet.
 - 2. Other typical buildings – one per 2500 gross square feet.
 - 3. Unique requirements
 - a) For areas where high end-device density is anticipated, special consideration for wireless coverage shall be examined (see item 1.2, A., 2., b)).
 - 1) Generally, 25 end-devices (not persons) per WAP.
 - 2) As wireless technology rapidly evolves, changes to RF spectrum usage may trigger changes to WAP density and mounting.
 - b) Auditoriums and large classrooms utilize applications requiring a high density of WAP coverage and also require special accommodations for WAP installations. The WAP density is driven by concurrent users sessions and bandwidth requirements in the space instead of area coverage. Close consultation with ITS is required.
 - 1) Estimate the following number of access points based on the occupancy in the following chart:

Classroom/Auditorium Occupancy	Estimated number of WAPs
Up to 125	1 WAP / 25 people

125 - 200	9
200 - 300	14
300 - 400	18
400 - 500	21

- 2) Proper installation and mounting of WAPs in these spaces may result in WAPs with moderate to high visibility. Mounting above a hard deck ceiling or below a hard floor or in proximity to metal building components, HVAC ducts, etc. can diminish the wireless signal beyond the tolerances for a high-density deployment. Current deployments of WAPs in these types of spaces typically have WAPs visibly mounted to both the ceiling and underneath the classroom seating in box enclosures or from the walls.
- 3) Cabling pathways to ceiling mount WAP locations as well floor or wall locations must be planned. Pathways are to be rigid conduit placed above ceiling, or in the wall.
- 4) Some auditorium or large classroom configuration may require the use of external antennas connected to the WAPs. These antennas may mount as patches or poles and may require being mounted in visible locations.
- 5) Under seat mounting utilizes lockable RF enclosures with dimensions of 11" x 11" x 4.4". Seating types must leave clearance for the placement of these enclosures underneath all configurations of the seating.
 - (i) Under floor mounting may be used as an alternative to placing locked enclosures underneath seating, however, ITS shall be consulted for this type of design.
- 6) Space for RF absorbent foam may be required for WAP installations inside walls or under floor.

C. Identification on drawing floor plans

- 1. Communications data outlets for WAPs shall have a distinct symbol on the drawings.

D. Cabling infrastructure

- 1. Each communications data outlet for a WAP is to be served by one (1) category 6a outlet/cable.
- 2. Cable locations/mounting will be designed for below ceiling and flush mounted WAPs. Any exceptions, such as high-density locations, shall be approved by ITS.
- 3. The outlet backbox shall be affixed to the structure.
- 4. The faceplate shall be stainless steel.

5. Distance limitation of external antennae coax cable is one meter.
6. Provide (1) 7' and (1) 25' plenum-rated (green) patch cord. Patch cords can be coiled to reduce slack cordage. Cordage shall not be placed on top of ceiling tiles.

1.3 SUBMITTALS

- A. The following submittals are due at the Pre-Construction Phase, in accordance with submittal requirements in Section 27 00 00 Communications:
 1. Shop Drawings
 - a) Provide scaled drawings (not less than 1/8" = 1'-0") indicating location of communications outlets for the WAPs, as well as the routing of conduits and locations of all pull points (to include pull boxes, communications LB, etc.). These locations shall be coordinated with all other trades.
- B. The following submittals are due Post-Construction, in accordance with the submittal requirements in Section 27 00 00 Communications:
 1. Record Drawings
 - a) Provide scaled AutoCad and PDF drawings (not less than 1/8" = 1'-0") indicating actual location of communications outlets for the WAPs, as well as the actual installed routing of conduits and locations of all pull points. Design or shop drawings with field notes will not be accepted.

PART 2 – PRODUCTS

2.1 GENERAL

- A. ITS will provide the WAPs and related equipment (POE switches, patch cables, controllers) in its scope of the project, and can provide the architects specifications for aesthetic concerns. Equipment changes frequently, so the project must get the current part numbers from ITS.
- B. Typically used WAP models (as of July 2012)
 1. Cisco Aironet 3600e Access Point
 - a) Utilizes external antennas for use in indoor environments
 - b) AIR-CAP3602E-x-K9 - Dual-band controller-based 802.11a/g/n
 2. Cisco Aironet 3600i Access Point
 - a) Equipped with internal antennas for use in indoor environments
 - b) AIR-CAP3602I-x-K9 - Dual-band controller-based 802.11a/g/n
- C. Typically used antennas (for Cisco 3600e Access Points as of July 2012)
 1. Cisco AIR-ANT2566P4W-R= 2.4 GHz 6 dBi/5 GHz 6 dBi Directional Ant., 4-port, RP-TNC
 - a) This will have 4 coax cables with RPTNC connectors.
 2. AIR-ANT-4210Y-R - Cisco 2.4 GHz 10dBi Yagi Antenna w/ RPTNC Plug Connector
 - a) Yagi antennas are used for under floor mounting.

PART 3 - EXECUTION

3.1 GENERAL

- A. ITS shall install WAPs after substantial completion (requires all cabling/mounting be installed and tested in secure communication closets).
- B. Installation times will vary but a single crew consisting of two technicians will take an average of 1 hour per WAP to install, patch, and troubleshoot.

END OF SECTION