Wired for Wireless

Cabling and Infrastructure for Wireless Networks

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CWNP CertiTrek GROUP IT Professional Wi-Fi Trek 2016

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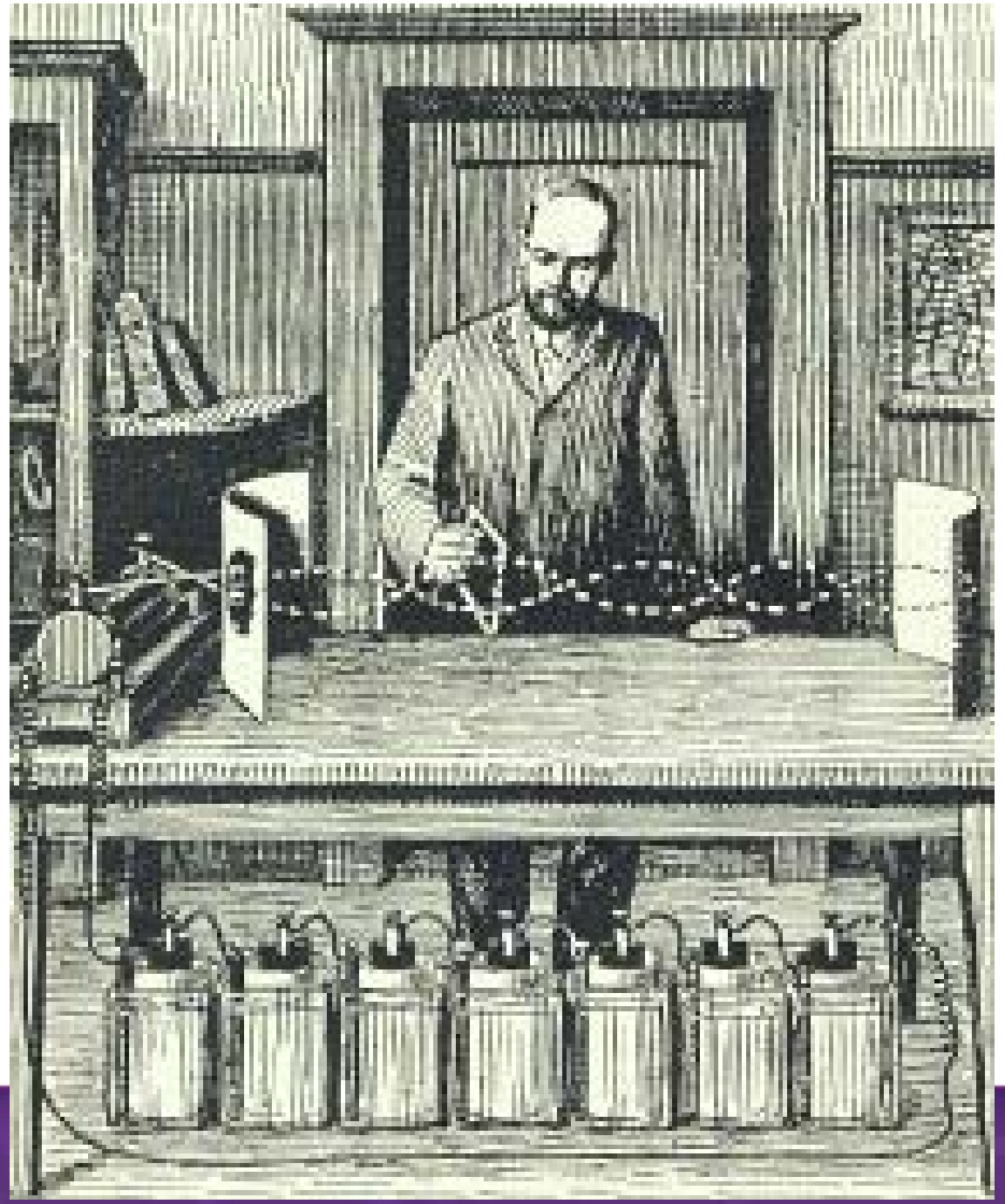
AGENDA

- 802.11ac Wave 1 and Wave 2, 802.11ad, 802.11ax
- NBase-T
- TIA Standards, BICSI Guidelines
- Healthcare and Hospitals
- Mounting APs
  - Performance
  - Aesthetics
  - Security



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802.11ac Wave 2 MU-MIMO TCP Throughput at the WAP (Mb/s)

	1SS Client	2SS Client	3SS Client	4SS Client
3 SS VHT 80 MHz WAP	303 Mb/S	607	910	N/A
4 SS VHT 80 MHz WAP	303	607	910	1,213
3 SS VHT 160 MHz WAP	607	1,213	1,820	N/A
4 SS VHT 160 MHz WAP	607	1,213	1,820	2,426

802.11 ac Wave 2 TCP throughputs at the Ethernet connector. Courtesy of Peter Lane, Aruba Networks- Atmosphere 2015

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- **802.11ad**
  - An amendment to 802.11 standard, commonly referred to as Wi-Gig (Wi-Fi alliance certification)
  - Greater than 1Gb/s TCP throughput
  - 60 GHz operation – “tri-band” access points
  - “Line-of-sight” in-room operation due to attenuation through walls and ceiling tiles
- **802.11ax**
  - A new amendment to 802.11 standard, release in 2019??
  - Greater than 1Gb/s TCP throughput (four times improvement in average throughput per station) through advancements in coding and modulation
  - Operation between 1 GHz to 6 GHz

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NBase-T

- Consortium of companies created to carry out the stated mission “to promote the development of 2.5 and 5 Gigabit Ethernet technology for enterprise infrastructure”.
- Enable the transmission of data rates at 2.5 and 5 Gb/s over existing, installed Category 5e and 6 cabling
- NBase-T allows users to extend the lifespan of the installed cable, by refreshing the electronics at each end of the cable.
- The IEEE P802.3bz 2.5/5Gig taskforce is developing an amendment to standardize 2.5/5 Gig products.

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Telecommunications Systems Bulletin TSB-162A “Telecommunications Cabling Guidelines for Wireless Access Points”

- Category 6A balanced twisted-pair cabling or OM3 optical fiber cabling is recommended for support of WLANs (especially NEW networks)
- Information on using link aggregation (the use of multiple equipment outlets (EOs) for a single access point) to support greater than 1 Gb/s Wi-Fi transmission rates and/or increased power requirements was added
- Maximum link length calculations were modified to account for different equipment cord types
- Information on wireless access point mounting options was added
- Information on physical security for wireless access points was added, including use of a locking enclosure

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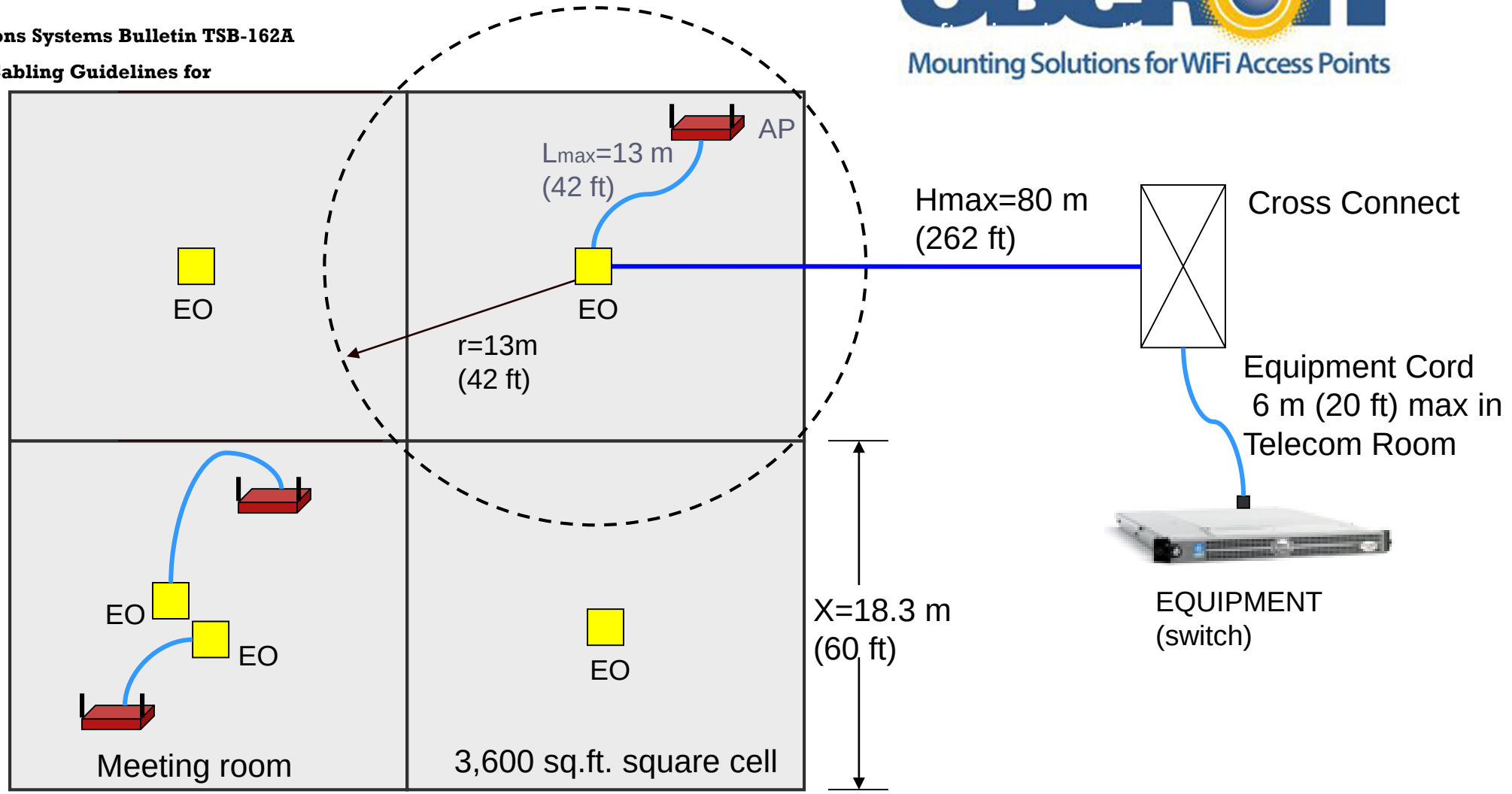
From Telecommunications Systems Bulletin TSB-162A

"Telecommunications Cabling Guidelines for Wireless Access Points"



Mounting Solutions for WiFi Access Points

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TIA 568-C.1 Commercial Buildings Telecommunications Cabling Standard

- Horizontal cabling is terminated in a telecommunications outlet
- Bend radius is 4X cable diameter for horizontal cables, 1 X cord diameter for patch cord
- National Electric Code (NEC)
  - Paragraph 300.22- Wiring in ducts, Plenums and Other Air-Handling Spaces
  - Paragraph 300.23 Panels Designed to Allow Access

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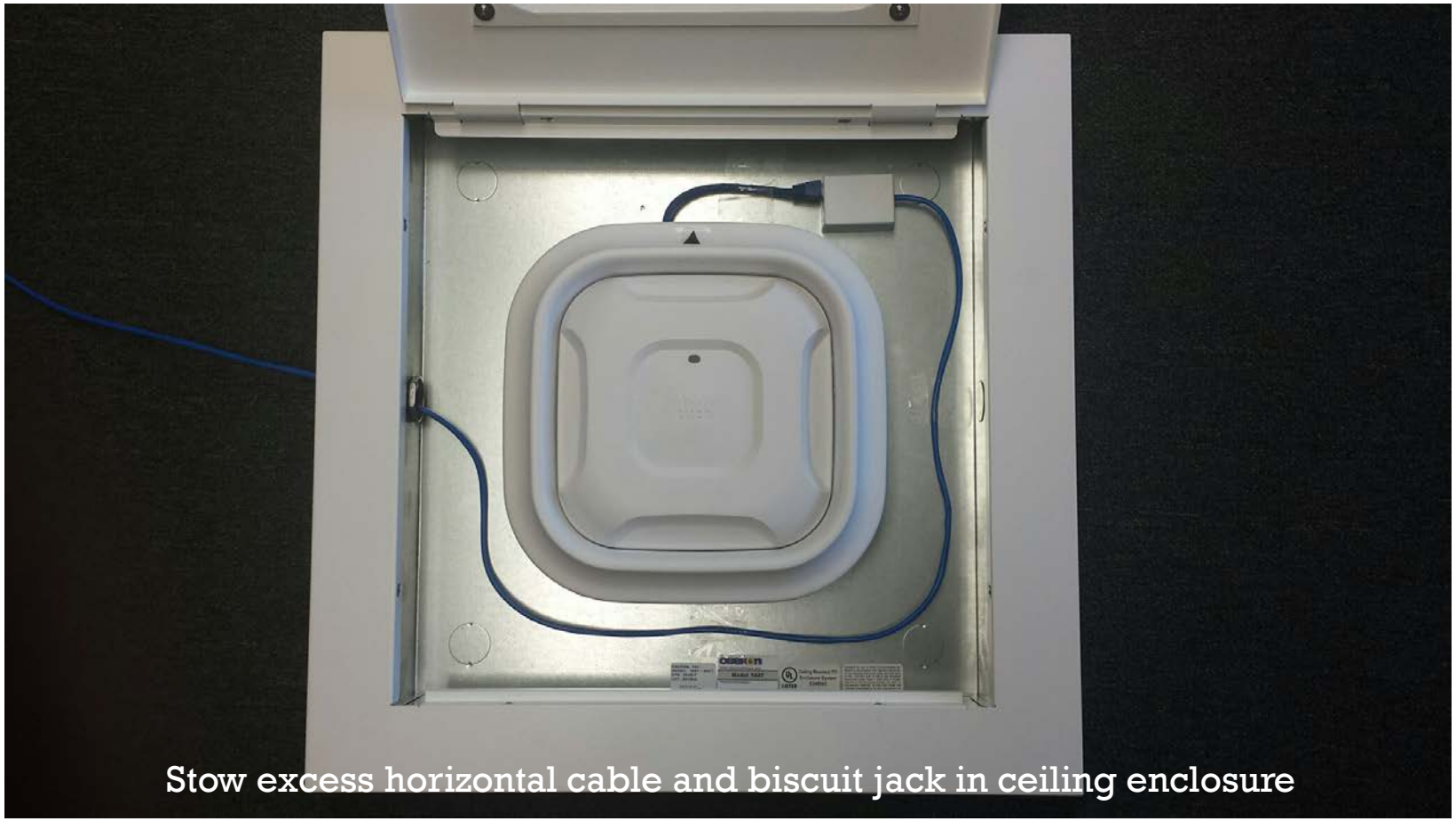

Stow excess horizontal cable and biscuit jack in ceiling enclosure

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- **Hospital Wireless Networks References**

- TIA ANSI/TIA-1179 *Healthcare Infrastructure Standard* - ..” infection control requirements could have a serious impact on times and conditions for cabling installs, moves, adds, and changes as well as restrictions on removing ceiling tiles, wall penetrations and access to unoccupied spaces”

- BICSI-004- *Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities*

- BICSI *Guide to Medical Grade Wireless Utility*- Passive antennas can be mounted above or below ceiling. Active equipment (access points) should be in cabinet flush with or below ceiling or wall mounted.

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- **WIRELESS ACCESS POINT MOUNTING**

✓ Performance and Coverage
✓ Aesthetics
✓ Physical Security
✓ Maintenance and Access
✓ Future readiness
✓ Code Compliance
✓ Installation time and cost

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- **Suspended Ceiling and “Cloud” Ceiling Mounting**
  - Attached to grid, hanging from ceiling
  - Above suspended ceiling (both Cisco and Aruba networks advise against)
  - In a flush ceiling enclosure or mount

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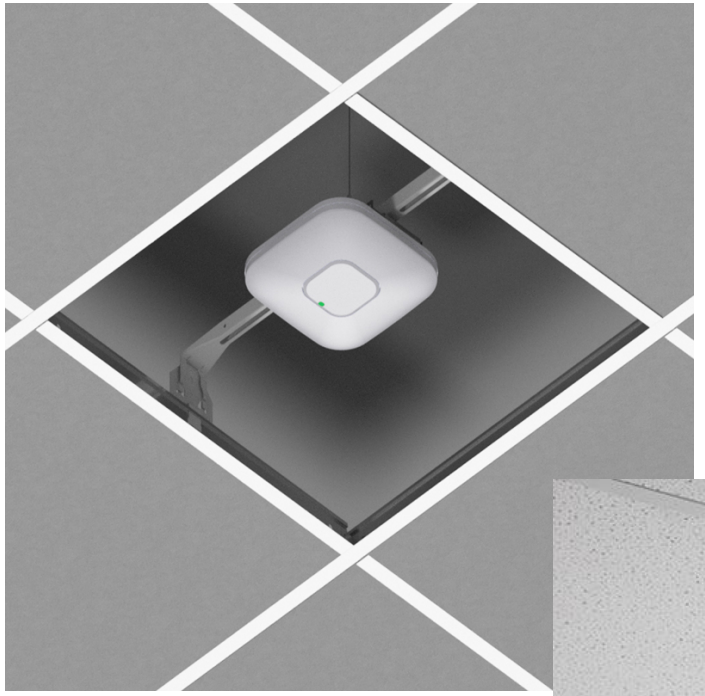
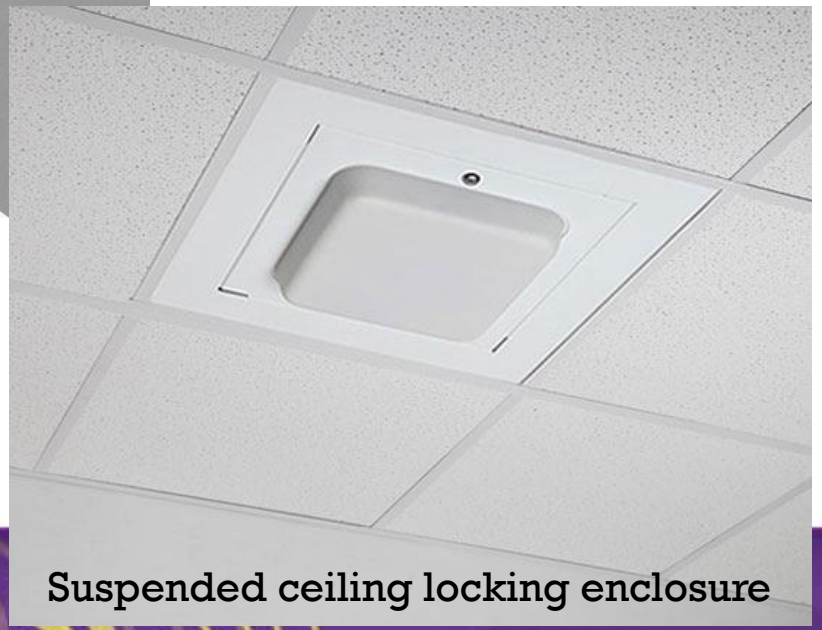
- **Suspended Ceiling Mounting**



Above ceiling hanger

- ❑ Performance and Coverage
- ❑ Aesthetics
- ❑ Physical Security
- ❑ Maintenance and Access
- ❑ Future readiness
- ❑ Code Compliance
- ❑ Installation time and cost



Suspended ceiling locking enclosure

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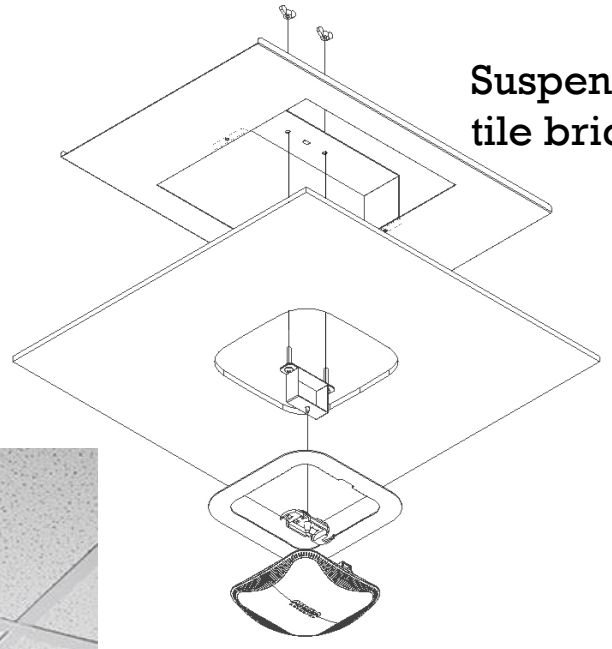
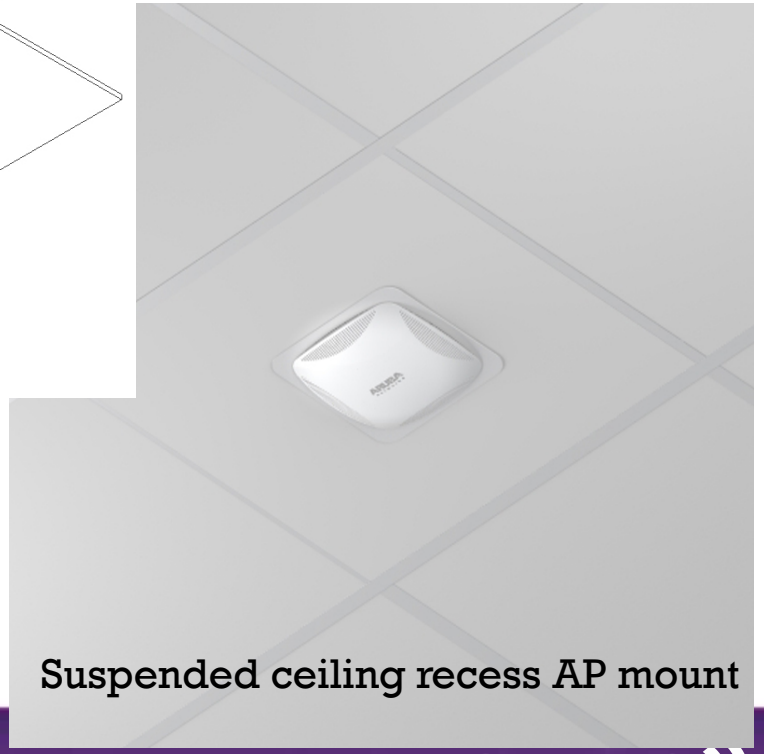
Mounting Solutions for WiFi Access Points



Suspended ceiling recess AP mount tile bridge



Suspended ceiling recess AP mount

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- **Hard Ceiling and Wall Mounting**
  - Surface Mount on hard wall or ceiling
  - Recess mount on hard wall or ceiling
  - Right angle brackets for wall

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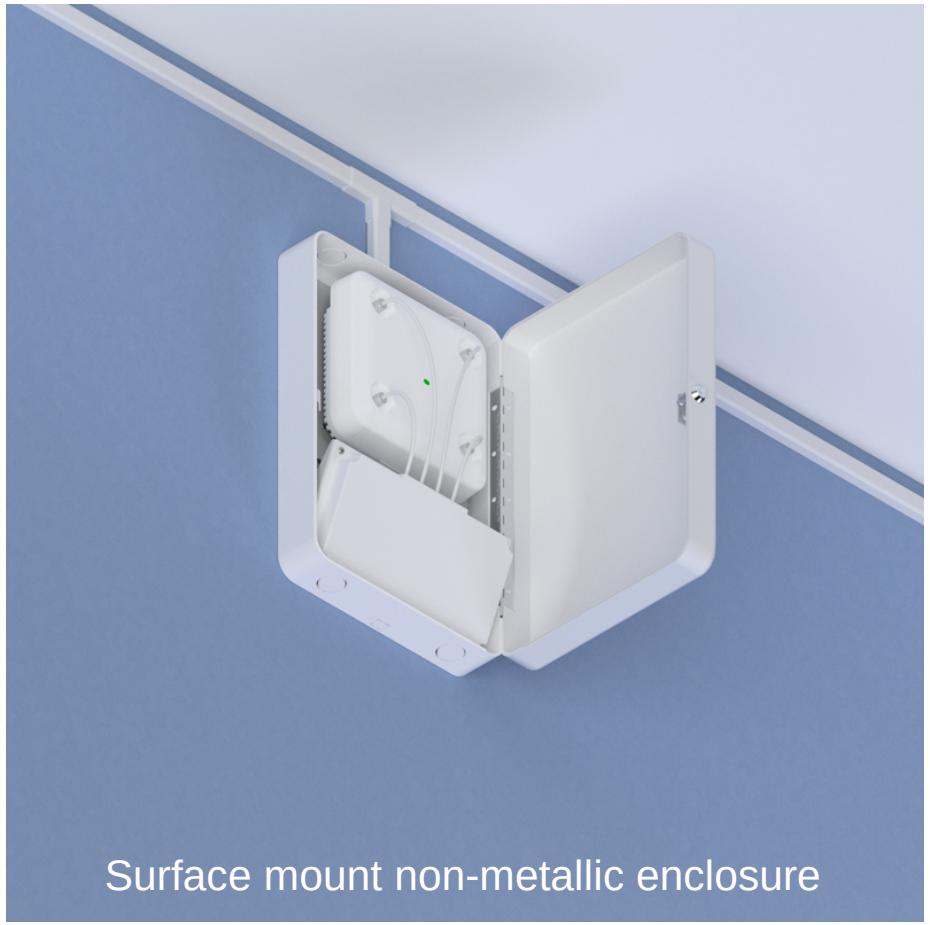
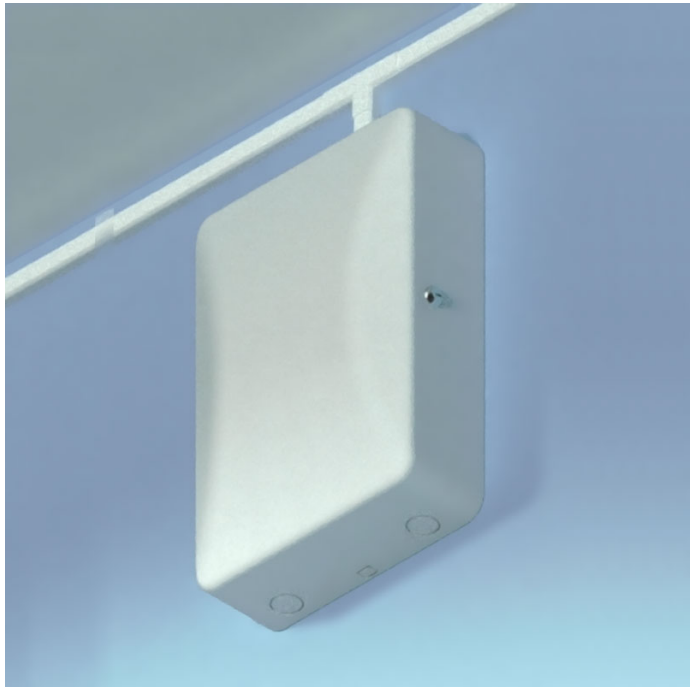
- **Surface Mount on Hard Ceiling and Wall**

Surface mount box



Surface mount non-metallic enclosure



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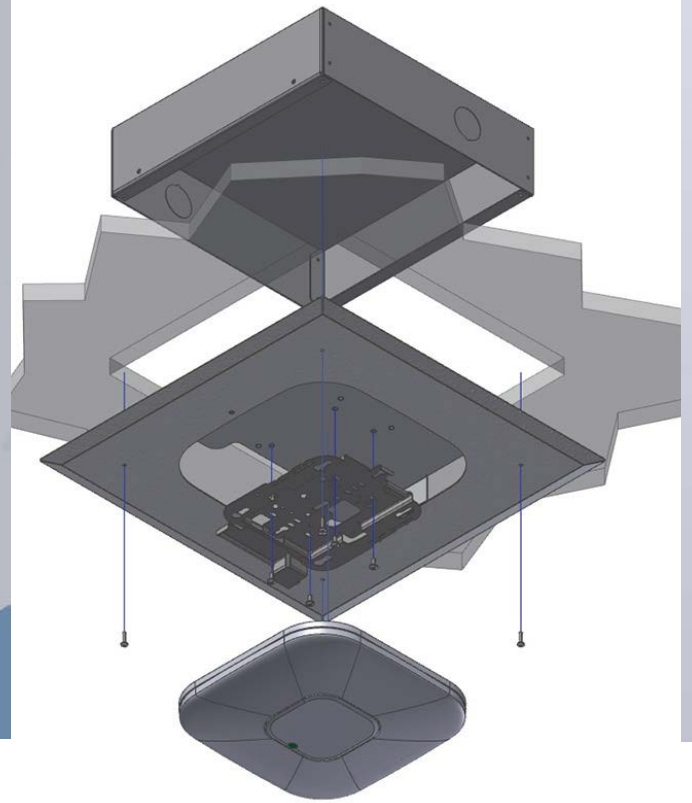
- **Recess Mount on Hard Ceiling and Wall**

Recess mount trim and cover



Recess mount with backbox

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- **Right Angle Brackets on Wall**

Right angle wall bracket for AP

Right angle wall bracket with outlet cover

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- **Open Ceilings**

Right angle wall bracket for AP with black vanity cover

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Mounting Solutions for WiFi Access Points

Hanging conduit or pendant AP mount

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More information on wireless infrastructure solutions

www.oberoninc.com