

## 2U.2—Wi-Fi Antenna Installation Guidelines

### 1 Scope

This document covers the installation of wi-fi type antennas on distribution and streetlight poles. The guidelines contained herein are intended to avoid operational problems and to ensure installations comply with existing laws and regulations. This guide is not considered to be all-inclusive. Depending on the local operating and weather conditions, deviations from this document may be required as determined by local operations staff.

### 2 Special Conditions

Any attachment to supply-line or fiber systems where a wireless terminal is attached in the supply space and a tail or lead traverses the distance from the supply space into the communication space of the attached structure is prohibited. If the wireless device must connect to supply-line or fiber systems in the communications space, it shall be installed on a separate structure unless the wireless device is also permitted in the communication space.

### 3 Coordination between PacifiCorp and the Attaching Entity

Close coordination with the attaching entity will be necessary to complete the installation. This guideline may be shared with the attaching entity prior to designing the installation so that they may be aware of PacifiCorp's basic requirements. Following are detailed requirements for attachments to PacifiCorp poles. For a checklist of deliverables due to the PacifiCorp Joint Use department, see Section NO TAG.

#### 3.1 Attachment agreement

Entities wishing to install any equipment on PacifiCorp's poles shall have a signed Attachment Agreement in effect prior to making application for attachment. If such an agreement is not currently executed, please contact PacifiCorp's Joint Use department to arrange one.

#### 3.2 Making an Application

All requests from any attaching entity wishing to install a wi-fi antenna on any PacifiCorp facility shall be sent to the PacifiCorp Joint Use department in Portland, Oregon. Prior to installing any equipment on PacifiCorp's pole, the attaching entity shall make application and receive written approval from PacifiCorp to attach the antenna. PacifiCorp may accept a proposed location, require changes to allow the installation at the attaching entity's expense, or decline the proposed location.

No installation shall commence until written approval is given from PacifiCorp's Joint Use department. The request shall identify the applicant, the installation contractor, the

address of the pole, the facility point number (from the pole tag) if present, and a photograph of the upper portion of the pole or streetlight, including the surrounding wires and aerial space. In addition, the following information is required:

### 3.2.1 Wi-Fi Antenna Information

Requester shall provide PacifiCorp a copy of the wi-fi antenna's physical and electrical information. This document shall have information on radio frequency (RF) exposure from the wi-fi antenna. The antenna's RF shall be in accordance with the Federal Communications Commission (FCC) regulations regarding RF exposure from antennas to workers. Also, requester shall clearly and conspicuously post signs indicating:

- Safe working distance (approach distances) from the device; and
- Contact information for field workers, including information for temporary disabling of antenna at the site.

### 3.2.2 Electrical Load Information

Requester shall supply information for electrical connection, such as demand in kW, voltage required, and method of connection to source. PacifiCorp is not responsible for possible poor performance of the electrical supply due to incorrect information provided by the customer.

### 3.2.3 Physical Information for Devices

Requester shall provide physical dimensions for the device and antennae as well as weight information. A typical installation drawing or photo shall be submitted which demonstrates that the antenna is designed so as not to experience wind loading of more than four pounds per square foot based on 40 MPH wind.

## 3.3 Zoning and Permits

Requester is wholly responsible for obtaining all government-required permits and approvals. Furthermore, requester is responsible for removing the equipment if requested by the local authority.

## 3.4 Removal cost

The equipment owner shall incur all costs of removing the equipment from a pole in the event that the equipment is abandoned or no longer in service.

## 4 General Installation Requirements

This section identifies the basic requirements for a wi-fi antenna installation on a distribution or streetlight pole. For further detail on installation requirements, see the PacifiCorp Distribution Construction Standards, *EU—Joint Use*.

#### 4.1 Installation on Streetlight-Only Poles

Antennas may be installed on streetlight-only poles without any utility primary wires or Joint Use attachments, provided the installation does not interfere with maintenance of the structure or streetlight.

All installations shall be made and maintained in compliance with the current National Electrical Safety Code (NESC), or if in California, General Order 95 (GO 95).

No additional devices are allowed on the pole without prior approval from the PacifiCorp Joint Use department.



Figure 1—Typical Wi-Fi Antenna Installation on Streetlight Pole

#### 4.2 Installation on Distribution Poles

Antennas may be installed on primary and/or secondary distribution poles, either: 1) on the streetlight mast, provided the streetlight is located in the power supply space, or 2) on the pole in the communication space, using extension arm or crossarm construction, provided material and strength specifications are suitable and approved for such installations.

All installations shall be made and maintained in compliance with the current NESC, or if in California, GO 95.

No additional devices are allowed on the pole without prior approval from the PacifiCorp Joint Use department

The following figures illustrate proper antenna installation on distribution poles.

Volume 2—Distribution Overhead and Underground  
 Part U—Joint Use  
 Section 2—Wi-Fi Antenna Installation Guidelines

Antenna shall be installed by qualified workers on streetlights located in the power supply space.

Clearance in any direction will be based on rule 235I, table 235-6, row 1b (3" to neutral, 3" to secondary, and 6" plus 0.4" per KV in access of 8.7 KV line to line primary voltage).

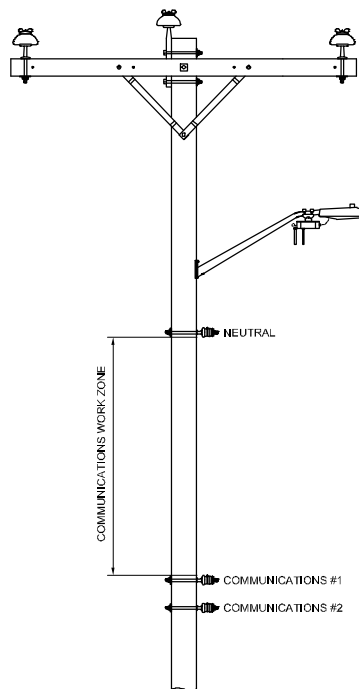


Figure 2—Antenna Installed in Power Supply Space

No antenna shall be attached to streetlights located in the communication worker safety zone, as described in rules 235C4 and 238E of NESC.

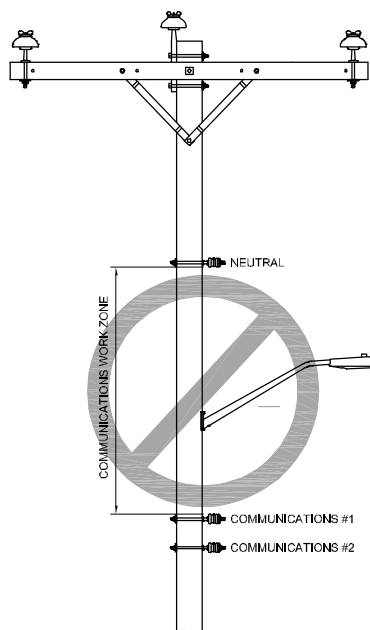


Figure 3—No Antennas on Streetlights in Communication Worker Safety Zone

Antenna may be installed in the communication space if attached to the pole. Antennas may not be installed on light fixtures located in the communication space

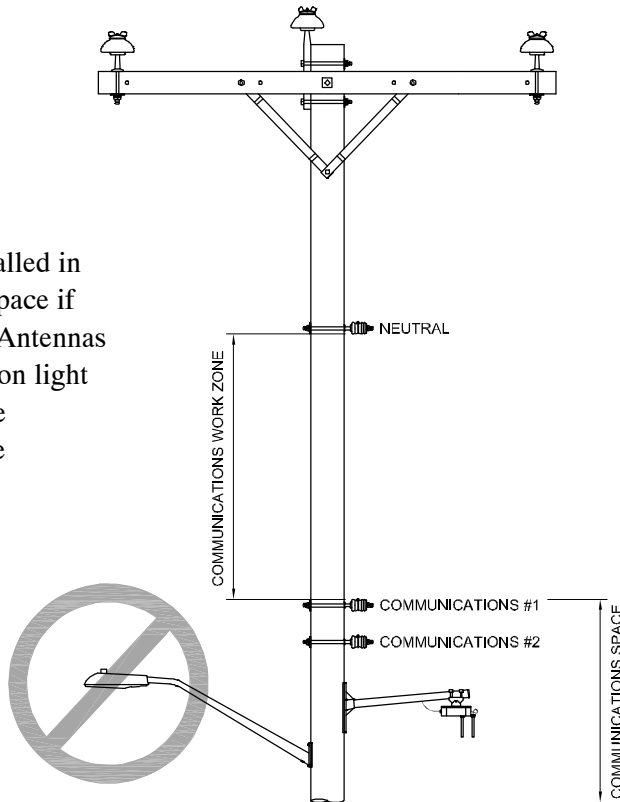


Figure 4—Antenna Installed on Pole in Communication Space

Installations shall not impede the climbing space on the pole. The climbing space is intended to provide adequate clearances on the pole for safe ascent and descent by the crew. The climbing space must extend 40" (48" in California) above and below the communication circuit.

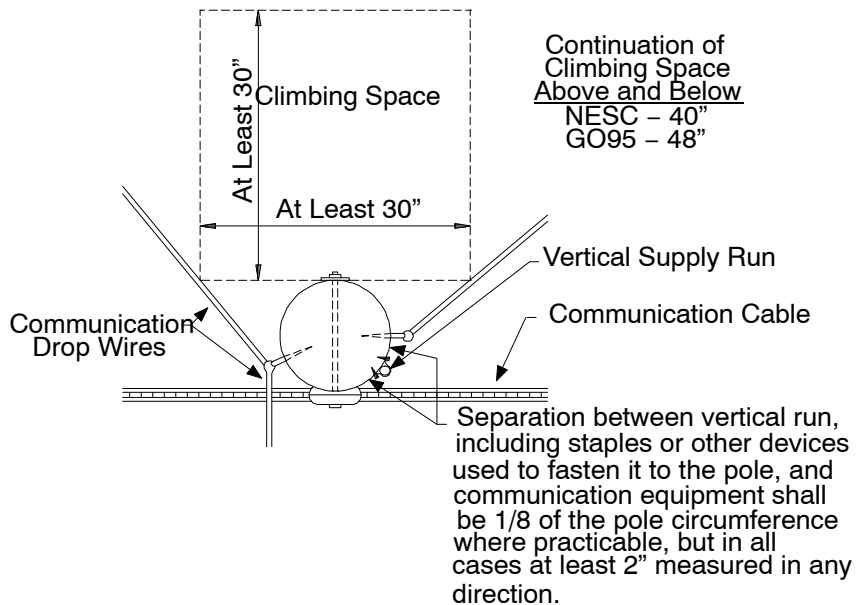


Figure 5—Climbing Space

## 5 Code requirements

### 5.1 Compliance with safety codes and rules

All attachments and work performed shall meet or exceed the requirements of the latest edition of the NESC (for example, rules 224A, 230C, 235C, 235I, 236, 238B, 238E, 239H, Section 42, Section 44 and 420Q); the Occupational Safety and Health Administration (rules 1910.268, 1910.097); applicable bulletins (FCC Bulletin 65 & IEEE C95.1, published in 1999); and the rules of any state agencies having jurisdiction.

### 5.2 Climbing Space

All facilities shall be installed in a manner that maintains adequate climbing space. The NESC defines the climbing space as a series of boxes 30 inches wide by 30 inches deep extending up the pole. See Figure 5 for more details.

### 5.3 Clearances

Local operations personnel may require a greater clearance distance to ensure that the approach distance is not compromised.

The following provides the minimum clearance from any part of the antenna to other equipment on the pole or ground surfaces. Refer to the latest copy of the NESC for other requirements or further detail:

1. Over the roadway, clearances shall exceed 16 feet.
2. Over driveways, parking lots, and alleys, clearances shall exceed 16 feet.
3. Over the pedestrian walkway, clearances shall exceed 12 feet.
4. Clearance to any supply wire shall be at least 48 inches.
5. Clearance to any other communications wire or equipment shall be 2 feet or more.
6. Horizontal clearance to pole surface shall be at least 2 feet.
7. The climbing space shall not be obstructed (see PacifiCorp Construction Standards *EU—Joint Use*).
8. Any antenna in the supply space shall be installed and maintained by workers authorized and qualified to work in the supply space.
9. All antennas shall be installed so as not to obstruct traffic control devices, signs, or vehicle sight lines.
10. No attachment method shall promote rust or decay of any kind to the pole or structure.
11. Some streetlights may have a wind rod attached above the arm. The wind rod must be considered part of the bracket-carrying luminaries as discussed in NESC rule 238C; therefore, clearances must be measured from this rod.

## 6 Checklist for Wi-Fi Attachments to PacifiCorp Facilities

Prior to attaching wi-fi devices to PacifiCorp facilities, the following must be provided to PacifiCorp's Joint Use department:

- Attachment Contract executed with PacifiCorp.
- All installation locations, including:
  - Pole number (from PacifiCorp pole plate);
  - Height of attachment;
  - Direction of any antennae (if applicable);
  - Address; and
  - Photographs of the top section of each pole showing streetlight and all attached wires/equipment.
- Employer's statement regarding qualification of employees performing installation (for installations in the supply space).
- Physical and electrical information, including:
  - Dimensions of device and antennae;
  - Weight;
  - Method of connecting to power source (e.g., photocell socket, etc.);
  - Maximum electrical demand in kW;
  - Voltage desired; and
  - Statement on size of RF field and worker-exposure limitations (include safe working distances and maximum exposure durations).
- Typical installation drawing or photo.
- Copies of applicable permits.

After PacifiCorp review:

- Corrections made either to the application or facilities in the field, if required by PacifiCorp.
- Receipt of Permit to Attach from PacifiCorp.

Post-Installation:

- Notification that installation is complete (to trigger post-installation inspection).
- Receipt of post-inspection results and required corrections.
- Receipt and payment of invoice for any billable work performed by PacifiCorp.

Maintenance:

- Any future pole attachments and/or equipment additions or replacements (where physical/electrical properties or location are altered) must be approved by the PacifiCorp Joint Use department.

*Volume 2—Distribution Overhead and Underground*  
*Part U—Joint Use*  
*Section 2—Wi-Fi Antenna Installation Guidelines*




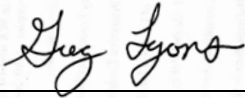
## 7 Handbook Issuing Department

The Standards Engineering Documentation Department of PacifiCorp is responsible for issuing this document. Comments and suggestions are welcome. Additional copies may be obtained from:

Standards Engineering Documentation, Lloyd Center Tower  
825 NE Multnomah St., Suite 1600, Portland, Oregon 97232  
Telephone: (503) 813-5293 Fax: (503) 813-6804

Technical questions regarding the content of this document may be directed to PacifiCorp Standards Engineering, (503) 813-6883. Publication and use of this document is authorized by the Manager of Standards Engineering when the block below has been signed.

Approved:   
Dave Asgharian  
Standards Engineering

Approved:   
Greg Lyons, Manager  
Standards Engineering and Technology Development



ENGINEERING HANDBOOK  
[OTHER ENTITY]

EXHIBIT D  
SCHEDULE 2  
PAGE 1 OF \_\_