AGENDA

DESIGN REVIEW BOARD – URBAN DESIGN PANEL
AGENDA
Regular Meeting
July 2nd, 2020
4:00 PM
Webex Virtual Meeting

Public meetings will be hosted virtually online and can be accessed at greenvillesc.gov/meeting using the password meetnow. Instructions to access the meeting, and information regarding a remote viewing location, are included at the end of this notice.

A remote meeting viewing location has been set up at the Greenville Civic Center at 1 Exposition Drive in Room 102.

1. Call to Order
2. Roll Call
3. Welcome and Opening Remarks from the Chair
4. Approval of Minutes – June 4th, 2020
5. Call for Public Notice Affidavit from Applicants
6. Acceptance of Agenda
7. Conflict of Interest Statement
8. Call for Public Comment
9. Old Business (public hearing)
   A. None
10. New Business (public hearing)
    A. CA 19-674
       Application by Kimley-Horn for a CERTIFICATE OF APPROPRIATENESS for small-cell wireless facility utility pole designs.
11. Other Business (Not a Public Hearing)
   A. None

12. Advice and Comment (Not a Public Hearing)
   A. None

13. Informal Review (Not a Public Hearing)
   A. None

14. Adjournment

You are invited to review documents relating to these applications before the public hearing. Application materials are posted online at http://www.greenvillesc.gov/drb. You may contact the Planning Office at (864) 467-4476 for more information. Application materials are subject to change.

You will have the opportunity to voice your comments at the public hearing. Each speaker is limited to 3 minutes. Repetitive statements should be avoided; individuals sharing similar concerns are encouraged to appoint a spokesperson to represent their group. Alternatively, you may submit written comments to: Planning & Development Office, PO Box 2207, Greenville, SC 29602, by fax at (864) 467-4510, or by email at planning@greenvillesc.gov.

Written comments must be received by 2PM Monday before the hearing in order to be given adequate time for consideration by the Board before the hearing. Comments received after 2PM Monday will be provided to the Board at the hearing. Please reference the application number and include your name and address on all correspondence. All comments will be made part of the public record.

In some cases the applicant may be required, as part of the application process, to hold a neighborhood meeting before the application is heard by the Board. Property owners within 500’ of the application site would then be notified by mail. A property owner that directly abuts the proposed project or owners of 20% of parcels within 500’ may also request a meeting. Contact the Planning and Development Office for further instructions.'

Webex Meeting Instructions

Steps for Online Access

1. Visit greenvillesc.gov/meeting. You can also go to greenvillesc.gov and click on ONLINE MEETING.

Enter your: First Name
Enter your: Last Name
Enter the event password: meetnow
Click: Join Now

Steps for Phone Access

1. Dial: +1-415-655-0002
2. Enter Access Code: 129-027-5665

Remote Viewing Location

A remote meeting viewing location has been set up at the Greenville Civic Center at 1 Exposition Drive in Room 102.

The City seeks input from citizens while adhering to public health and safety guidelines. All attendees at the remote viewing location will be subject to a temperature screening with a touch-less forehead thermometer. Anyone with a temperature reading above 100 degrees Fahrenheit will not be admitted. Attendees will be required to wear a covering over their mouth and nose, unless it violates a religious tenant or belief or causes difficulty breathing.

Procedure for Public Comment during Meeting

1. The Design Review Board Chair will read through each agenda item and call for a list of names who wish to speak during public comment. The public shall communicate directly with the Planning Staff Liaison if they wish to speak on the specific agenda item.
2. The Planning Staff Liaison will take a list of names, which will be called in order at the time of the specific agenda item, to provide public comment.
3. The Planning Staff Liaison will communicate directly with the public during the public portion of each item to provide comments on the specific agenda item.
4. Each member of the public shall provide their comments when their name is called by the Planning Staff Liaison.
5. Each member of the public will have 3 minutes to speak on the specific agenda item. When speaking: Begin by clearly stating your name and address for the record. Please spell your name if it is prone to be misspelled. The 3-minute timer will start after you provide this information. Please do not repeat information already presented by someone else and avoid off-topic statements. Those who wish to share similar concerns are encouraged to appoint a spokesperson to speak on behalf of the group. Direct all comments and questions to the chairperson, who will respond or direct the question to the appropriate party for response.
6. The Planning Staff Liaison will continue through the list of names until all members of the public who wished to speak on the specific agenda item have had an opportunity.
7. Once all names are called and public comment provided, the public portion for that specific agenda item will be closed.
Docket Number: CA 19-674
Applicant: Kimley-Horn
Property Owner: City of Greenville
Property Location: MULTIPLE
Tax Map Number: City of Greenville Right-of-Way
Zoning: C-4, Central Business District
Proposal: CERTIFICATE OF APPROPRIATENESS FOR NEW WIRELESS INFRASTRUCTURE
Staff Recommendation: Approval with Conditions

Applicable Sections of the City of Greenville Code of Ordinances:

Sec. 19-4.3.2(G) – Wireless Communications Facility

Staff Analysis:

Kimley-Horn, a planning and engineering design firm, on behalf of Verizon Wireless, proposes to install new small-cell wireless facility poles within public rights-of-way. Wireless communications facilities located within the downtown area shall be of a design approved by the Design Review Board – Urban Panel. The applicant is seeking design approval for two (2) types of new poles:

1. Wood pole
2. Metal pole

Small-cell wireless technology within Greenville is regulated under Section 19-4.3(G) – Wireless Communications Facility. Per the Land Management Ordinance, each wireless facility within the right-of-way shall be approved by the Division of Public Works through an individual node site license.

NOTE: The applicant has not submitted an application for a node site license or a comprehensive list of downtown/neighborhood locations for the new small-cell nodes. With this application, the applicant seeks approval for the two pole designs only and will seek individual node site licenses at a later date.

Section 19-4.3.2(G)(5) permits new wireless communications facilities within public rights-of-way in the form of new utility poles, provided the other applicable provisions of section 19-
4.3.2(G) are satisfied along with all ordinances and regulations governing public rights-of-way management. If new facilities are proposed, they may be approved provided that there are existing utility poles in the immediate vicinity and that the size and design of the new pole is similar in size and design to existing poles in the same right-of-way.

In the review of design proposals, the DRB may apply any standard that would normally be applied in the design review. However, Section 19-4.3.2(G)(5) also provides guidance to standards for the design of wireless facilities, discussed below.

All elements of the wireless communications facility, including the pole to which it is attached, must be consistent with the overall design and character of both the neighborhood and location in which it is placed. The wireless facility must also demonstrate consistency with any publically-available planned improvements to those neighborhoods. When proposed in a right-of-way, the wireless communications facility must be consistent with both the corridor conditions and context in which it is placed, and any publically-available planned corridor improvements. Facilities are to be as unobtrusive as possible. Where a new pole is permitted in the public right-of-way, it must either be a stealth facility (as a facility that does not look like a wireless facility) or a new utility pole, provided that there are existing utility poles in the immediate vicinity. If a new utility pole is proposed, the size and design of the new pole must be similar in size and design to existing poles in the same right-of-way.

The City Engineering Office maintains a Small-Cell Wireless Facilities Design Catalogue which contains previously-approved small-cell facility designs. The Catalogue states that these approved designs may be appropriate for comparable locations. Alternatively, an applicant may submit additional details for approval and inclusion in the catalogue. The two approved designs in the current Catalogue (‘ConcealFab’ and ‘Valmont’) feature black stealth poles with cobra-head lamps.

**Wood Pole**

The proposed wood pole design features a pole-top omni antenna and radio component and a side-mounted radio box toward the base of the pole. The applicant has indicated that total pole height (including the antenna) will be approximately 33 ft., which seems consistent with the height of existing poles in the area.

*Previously-approved designs for wood pole-top antennas have featured a concealed shroud at tope of pole rather than exposed omni-antennas. To be consistent with previous decisions made by the DRB, staff recommends that the antennas and radios be placed inside a shroud at the top of the pole rather than being exposed. The shroud should be the diameter of the pole, and should cover connectors to the pole. Further, staff recommends that the wood poles only be approved for rights-of-way in which there are existing wood utility poles along the same block face.*

*Equipment cabinets associated with the antennas must either be underground or must be a slim design that is about the width of the pole.*

It appears that the current design proposal conforms to this proposed staff condition.
Metal Pole

The applicant has submitted several variations for a metal pole design. One design features a full-coverage black shroud toward the top of the pole, while the other features a pole-top omni antenna and radio component. The applicant has also presented an accessory decorative lamp component for the metal poles. The applicant has indicated that total pole height (including the antenna) will be approximately 33 ft.

*Staff is not supportive of the proposed decorative lamp design because different areas of the central business district feature different decorative lamp designs (e.g. West End Commercial District). Staff finds that, with the exception of the cobra-head lamps, the proposed black slim pole, without the decorative lamps, is similar in appearance to those designs contained within the Catalogue as well as designs previously-approved in the downtown area. The applicant has indicated that their preference is to not include the lamps, as it would require detailed coordination with the electric company.*

*With application of the proposed conditions above, the Board could approve one or both pole designs proposed. Staff recommends the slimmer metal pole conforms more closely with stealth designs used elsewhere.*

Other Considerations

While approval of the proposed pole designs herein does not mean that the City will approve all future node applications that use this design, it is important to understand that approval of a generic pole design may effectively mean that structures of similar designs could be placed in applicable rights-of-way by both Verizon and other companies.

Further, once an application is approved, federal law may permit expansion of the design as of right, unless: (a) the design is a stealth facility and the change would defeat the goal of concealment; (b) the change would be inconsistent with specific aesthetic requirements, unless those aesthetic requirements prevent an increase in the height of the pole or antennas, or prevent the addition of cabinets to the pole. Because of this, if a design is approved, it may be important to specify the factors important to the approval. For example, if a design, proposed today, is approved because it is stealth, the approval action by the DRB should make that clear for the record.

Summary

The Land Management Ordinance states that new utility poles that feature wireless communications facilities shall be of a similar size and design to existing poles in the same right-of-way. Staff is of the opinion that the proposed wood pole and metal pole design (without the decorative lamps) designs are of a similar and compatible design to those found within the Small-Cell Wireless Facilities Design Catalogue and those previously-approved within the downtown area.

Therefore, staff recommends approval of the small-cell wireless facility pole designs to be added to the Small-Cell Wireless Facilities Design Catalogue **with at least the following conditions:**

1. The wood pole design shall feature a concealed antenna shroud of the same diameter as the wood pole for omni technology antennae and similarly suitable shroud proposal for future technology currently unspecified. Submit to staff a revised wood pole design
depicting the applicable shroud solution at the top of the pole rather than exposed antennas/radios; and

2. The wood pole design shall only be permitted for use in rights-of-way where there are existing wood utility pole along the same block face; and

3. Equipment cabinets should be about the width of the pole (so that from the opposite side they are only partially visible); and

4. Metal poles shall be of a slim design and feature the full concealed shroud design; and

5. The decorative lamps are not approved for the metal poles; and

6. Colorations should match the pole for the wood pole, and the stealth facilities should be colored the same as street lights along the same corridor; and

7. No elements are permitted that are not shown on the design (e.g., lighting, noise-generating equipment); and

8. This is a design approval only. All specific locations must be authorized by an individual node site license issued upon a showing of compliance with the LMO, the right-of-way management ordinance, and the terms of the Verizon Franchise Agreement dated November 25, 2019.

Note: Final approval of the small-cell upgrades are subject to site-specific node licenses jointly reviewed and issued by the administrator and the city engineer administratively.

Design Guidelines for the Central Business District

PUB 12. – Utilities

12.5 – Mitigate the impact of surface-mounted utilities in the pedestrian realm by siting them in softscape areas, screening them with vegetation and avoiding areas where tree roots are located.

Land Management Ordinance

Section 19-4.3.2(G) – Wireless Communications Facility

(1) General requirements. All wireless communications facilities shall comply with the following general requirements in addition to other applicable provisions of this subsection 19-4.3.2(G):

[***]

(e) Lighting and signage.

(i) Lighting. Wireless communications facilities shall not be lighted unless required by the Federal Communications Commission (FCC) or the Federal Aviation Administration (FAA).

(ii) Signage. Except for signage that may be approved as a concealment element, signs located at or upon wireless communications facilities or installed by or on behalf of the entity that owns or uses the wireless communications facility shall be limited to
ownership and contact information, FCC antenna registration number (if required) and any other information as required by government regulation. Commercial advertising is strictly prohibited.

(f) Site usage.

[***]

(ii) Where stealth facilities are not feasible, base station and accessory equipment shall be located, designed, and/or screened to blend with the existing natural, or built surroundings to reduce the visual impacts as much as technically feasible, and to be compatible with neighboring land uses and the character of the community.

[***]

(iv) The wireless communications facility shall not produce noise that would interfere with the peaceable enjoyment of adjoining properties.

(v) The equipment installed as part of any wireless communications facility shall be minimized, so that the wireless communications facility is as unobtrusive as technically feasible.

(vi) The elements of the wireless communications facility, and any support structure to which it is affixed must be consistent with the overall design and character of the neighborhood and locations in which it is placed, and with publically-available planned improvements to those neighborhoods. For facilities in the rights-of-way, the wireless communications facility, and any support structure to which it is to be affixed, must be consistent with the corridor in which it is placed, and publically-available planned corridor improvements.

[...]

(4) Building, utility pole and light pole mounted wireless communications facilities.

a) Stealth facilities permitted. Base stations that are stealth facilities may be placed inside any existing building or other existing structures (other than off-premises signs) provided that the placement does not alter the physical dimensions of the structure. Portions of base stations that are stealth facilities may be attached to the side of any building or other existing structures, other than a single-family residential units and off-premises signs. However, installation is not permitted where it would adversely affect a historically significant or environmentally sensitive structure or area, and is only permitted where other elements of the wireless communications facility can be appropriately concealed by placing those elements on the rooftop, within the building, underground, or by some other means that conceals them from view. Antennas must be located at least 20 feet above ground level, and may not extend into any rights-of-way except as part of approved signage

[...]

(5) Special rules for placement within the public rights-of-way. In addition to the above requirements, the following rules apply to wireless communications facilities located within the public rights-of-way.
a) Applications for placement of wireless communications facilities must be submitted to the division of public works, to the attention of the city engineer and such applications may be decided administratively. If the city engineer determines that the installation complies with the requirements of any required franchise, and this ordinance, and has been appropriately designed for the existing and publically-available planned design of the corridor in which it is placed; or where applicant shows that denial would result in an effective prohibition within the meaning of 47 U.S.C. § 332(c)(7), or otherwise violates applicable law such that the City is required to issue a permit for placement, the application may be preliminarily approved, subject to appeal, and otherwise preliminarily denied or approved subject to conditions. Preliminary decisions become final unless appealed to the zoning board of appeals.

b) Preliminary decisions adverse to the applicant may be appealed to the zoning board of appeals within five business days of a preliminary decision, and in any case where there is a claim that denial will result in an effective prohibition within the meaning of 47 U.S.C. § 332(c)(7), or otherwise violates applicable law such that the City is required to issue a permit for placement, the zoning board of appeals shall hear and determine the matter, applying standards and following procedures that would be followed in issuing a special exception.

c) Approval shall be by way of an individual, site-specific node license jointly issued by the administrator and the city engineer (or their designees). Denials shall be in writing, based upon substantial evidence in a written record.

d) With respect to any location within the central business district or a preservation overlay district with residential character, wireless communications facilities shall be of a design approved by the design review board.

e) Wireless communications facilities shall not be located above-ground in any location where the lines of the incumbent local exchange carrier are underground, unless co-located on an existing structure or an existing structure is removed and replaced with a new structure which is substantially similar in size and appearance to the structure that is being replaced.

f) Placement of wireless communications facilities in the public rights-of-way shall not result in an increase in the number of support structures located in the public rights-of-way as of the date of enactment of this ordinance with the exception of those towers permitted under section 19-4.3.2(G)(2) or new utility poles. Provided, in the case of the latter, there must be existing utility poles in the same right-of-way in the immediate vicinity and the applicant must demonstrate that co-location upon said existing utility poles is not feasible or would require a modification such that an additional utility pole would be less intrusive or safer. If an additional utility pole is permitted under this provision, it shall be similar in size and design to existing poles in the same right-of-way and in the immediate vicinity, and spaced appropriately to minimize intrusiveness and to avoid creating undue hazard to persons or property; and

g) Where above ground facilities are permitted under this section 19-4.3.2(G)(4)(e) and/or (f) and the above-ground facilities of the incumbent local exchange carrier are subsequently placed underground, all wireless communications facilities in the same right-of-way, in the same area shall be placed underground at the sole expense of the owner.
h) Placement of wireless communications facilities or support structures for wireless communications facilities, or any modification thereto, is not permitted where the city engineer determines that, due to insufficient capacity, safety, reliability, or engineering concerns, existing infrastructure is not adequate to support the same; or the placements or modifications will unduly interfere with other uses of the rights-of-way, or require construction that will be unduly disruptive.
APPLICATION FOR
CERTIFICATE OF APPROPRIATENESS
URBAN DESIGN PANEL
Contact Planning & Development: (864) 467-4476

APPLICANT/OWNER INFORMATION

*Indicates Required Field

**APPLICANT**

<table>
<thead>
<tr>
<th><strong>Name:</strong></th>
<th>Joshua Godwin</th>
</tr>
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<tbody>
<tr>
<td><strong>Title:</strong></td>
<td>Small Cell Project Manager</td>
</tr>
<tr>
<td><strong>Address:</strong></td>
<td>10700 Sikes Place Suite 360 Charlotte, NC</td>
</tr>
<tr>
<td><strong>Phone:</strong></td>
<td>980-202-6515</td>
</tr>
<tr>
<td><strong>Email:</strong></td>
<td><a href="mailto:jagodwin@tepgroup.net">jagodwin@tepgroup.net</a></td>
</tr>
</tbody>
</table>

**PROPERTY OWNER**

<table>
<thead>
<tr>
<th><strong>Name:</strong></th>
<th>Verizon Wireless (Tuan Hoang)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong></td>
<td>Engineer - RE/Regulatory</td>
</tr>
<tr>
<td><strong>Address:</strong></td>
<td>8921 Research Dr. Charlotte, NC</td>
</tr>
<tr>
<td><strong>Phone:</strong></td>
<td>704-510-6120</td>
</tr>
<tr>
<td><strong>Email:</strong></td>
<td><a href="mailto:tuan.hoang@verizonwireless.com">tuan.hoang@verizonwireless.com</a></td>
</tr>
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PROPERTY INFORMATION

*STREET ADDRESS* City of Greenville & SCDOT Public Right-of-Way

*TAX MAP #(S)* City of Greenville & SCDOT Public Right-of-Way

*SPECIAL DISTRICT* C-4, C-2, RDV, O-D, R-M2, & PD

DESCRIPTION OF REQUEST

To include scope of project and justification or response to specific guidelines and special conditions.

Verizon Wireless would like to install Small Wireless Facility utility poles within the City of Greenville and SCDOT Public Right of Ways. The attached shows the design options Verizon is proposing for approval within the City of Greenville. The Utility poles will consist of an Omni Antenna, Low-Band radios underneath the Omni Antenna, Radio Shroud, Power meter and disconnect, conduit and an in-ground fiber hand-hole beside the pole.
APPLICATION FOR CERTIFICATE OF APPROPRIATENESS
URBAN DESIGN PANEL

Contact Planning & Development:
(864) 467-4476

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<thead>
<tr>
<th>APPLICANT</th>
<th>PROPERTY OWNER</th>
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<tr>
<td><strong>Name:</strong> Ryan Doolittle</td>
<td></td>
</tr>
<tr>
<td><strong>Title:</strong> Small Cell Project Manager</td>
<td></td>
</tr>
<tr>
<td><strong>Address:</strong> 421 Fayetteville Street, 7th Floor, Raleigh, NC 27601</td>
<td></td>
</tr>
<tr>
<td><strong>Phone:</strong> 919-677-2000</td>
<td></td>
</tr>
<tr>
<td><strong>Email:</strong> <a href="mailto:ryan.doolittle@kimley-horn.com">ryan.doolittle@kimley-horn.com</a></td>
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INSTRUCTIONS

1. Preliminary meeting with staff is required prior to application submittal.

2. All applications and fees (made payable to the City of Greenville) for Certificate of Appropriateness must be received by the Planning & Development office no later than 2:00 p.m. on the date reflected on the attached schedule.

   A. URBAN DESIGN PANEL
      Site plan review $300.00
      Architectural review $300.00

   B. SIGNS $150.00

   C. APPLICATION FOR STAFF REVIEW
      Major (all site development activity, roof gardens, decks or accessory structures; or any project that requires consultation with a member of the DRB). $100.00
      Minor (color change; replacement of windows/doors; additions, deletions or replacement of awnings; re-roofing; and projects that do not involve structural alterations, increase/decrease in window/door area or removal of architectural features). $50.00

   D. INFORMAL REVIEW

   E. MODIFICATION TO AN APPROVED PROJECT
      Major (requires review by DRB) ½ original fee
     Minor (requires review by staff) $50.00

   F. REVISIONS (multiple required revisions may be subject to additional fees).

3. The staff will review the application for “sufficiency” pursuant to Section 19-2.2.6, Determination of Sufficiency and will contact the applicant to correct any deficiencies, which must be corrected prior to placing the application on the Design Review Board agenda.

4. If the application requires review by the Urban Design Panel, public hearing signs must be posted on the subject property at least 15 days (but not more than 18 days) prior to the scheduled hearing date.

5. You must attach one (1) complete set of scaled drawings of the property at an appropriate scale such as 1”=20’ or ¼”=1’, etc. Although construction drawings are not required, applicants for final approval should be able to provide construction drawings at the Design Review Board’s (DRB) request. The Board may request additional information at any time to fully understand the proposal. Items submitted to the Board become the property of the City and will not be returned.

SITE PLAN REVIEW

- Site Plan Drawings (indicating footprint of existing buildings, proposed building, proposed exterior elements, demolition of existing site features, floor plan, proposed exterior equipment, etc.).

- Massing Studies and Images (images shall be high resolution and should depict adjacent building, proposed building massing from various viewpoints, initial architectural details, photos of surroundings to review context, etc.).

- Model (physical or digital model that includes the surrounding context with massing only, no texture or articulation is required). The contextual model for the DRB boundary can be downloaded here: https://greenvillesc.sharefile.com/d-s4197849a61943358, and is provided as a .skp file. Data is updated monthly.
ARCHITECTURAL REVIEW

- Elevation Drawings of all Exterior Sides (indicate proposed materials, existing grade and proposed grade, proposed mechanical equipment, outdoor lighting fixtures, landscape drawings, design and location of signage, removal of existing building elements, addition to existing building, a streetscape elevation of building adjacent to and across the street from the site, including the proposed building).
- Sections (include vertical dimensions in feet, building sections where significant changes occur in building volume, wall section for review of material relationships).
- Detail Drawings (include material and methods of each type of construction affecting the exterior appearance of the structure, samples, brochures and photographs of all exterior finishes, windows, fixtures, lighting and signage).
- Renderings (include perspective drawings, including views from pedestrian and public realm).
- Model (physical or digital model that includes the surrounding context and should include accurate scale, architectural detail to the extent that if describes the design intent, proposed textures and proposed signage).

For more detail on these submittal requirements, please refer to the Greenville Downtown Design Guidelines, adopted May 2017.

Please verify that all required information is reflected on the plan(s). Please submit one (1) paper copy and one (1) electronic version of the plan(s).

6. Please read carefully:

The applicant and property owner affirm that all information submitted with this application, including any/all supplemental information, is true and correct to the best of their knowledge and they have provided full disclosure of the relevant facts.

In addition, the applicant affirms that the applicant or someone acting on the applicant’s behalf has made a reasonable effort to determine whether a deed or other document places one or more restrictions on the property that preclude or impede the intended use and has found no record of such a restriction.

If the Planning & Development office, by separate inquiry, determines that such a restriction exists, it shall notify the applicant. If the applicant does not withdraw or modify the application in a timely manner or act to have the restriction terminated or waived, the Planning & Development office will indicate in its report to the Design Review Board that granting the requested change would not likely result in the benefit the applicant seeks.

7. To that end, the applicant hereby affirms that the tract or parcel of land subject of the attached application is ____ or is not ____ restricted by any recorded covenant that is contrary to, conflicts with or prohibits the requested activity.

*Signatures

Applicant

Date 8/29/2019

Property Owner/Authorized Agent

Date 8/29/2019

Public Hearing Information

Public Hearing Signs
Zoning District: C-4
Zoning District: C-4
Zoning District: C-4
Zoning District: C-4
Zoning District: C-4
Zoning District: C-4 & C-2
Zoning District: RDV & C-4 & O-D
Zoning District: C-4
Zoning District: R-M2 & C-4

SMC_DT GVL W_SPLIT_Node_16
34.843267, -82.412129
PERRY AVE / RHETT STREET
GREENVILLE, SC 29601
WOOD POLE
Zoning District: C-4
GVL SOUTH NODE 3
34.8370131, -82.4007543
PEARL AVENUE
GREENVILLE, SC 29601
WOOD POLE
Zoning District: PD
GVL SOUTH NODE 3
EXISTING VIEW ACROSS STREET
GVL SOUTH NODE 3 VIEW WITH TRAFFIC

POLE-TOP OMNI ANTENNA

ADVANCED TECHNOLOGY (FUTURE)

LAA/CBRS RADIOS
GVL SOUTH NODE 3
VIEW AGAINST TRAFFIC

POLE-TOP OMNI ANTENNA

ADVANCED TECHNOLOGY (FUTURE)

LAA/CBRS RADIOS
GVL EXP Node 4
34.8476865, -82.39880204
Falls Street
Greenville, SC 29601
Metal Pole

View Across Street

View Against Traffic

View With Traffic
Zoning District: C4
POLE-TOP OMNI ANTENNA

LAA/CBRS RADIOS

ADVANCED TECHNOLOGY (FUTURE)
GVL EXP NODE 4
VIEW AGAINST TRAFFIC

POLE-TOP OMNI ANTENNA

LAA/CBRS RADIOS

ADVANCED TECHNOLOGY (FUTURE)
# Product Specifications

**CX16OMI236-1C**  
NWAV™ X-Pol OMNI Cantenna | 16-Port | 2.98 cu. ft | 360°

## 16-Port 2 ft 360° Cantenna with RET-controlled from 1695–2700 MHz  
(4) 698–960 MHz & (4) 1695–2700 MHz & (4) 3550–3700 MHz & (4) 5150–5925 MHz

- X-Pol, small cell, Hex-Port antenna  
- Suitable for pole or building mount  
- 4x4 MIMO low-band, 4x4 MIMO for each of AWS/PCS/CBRS/LAA  
- Internal beam combining  
- Dependent RET control for 1695–2700 MHz frequencies  
- Suitable for LTE/UMTS/CDMA/GSM technologies  
- Cost-effective solution for neutral host locations

## Electrical Specification (min./max.)

<table>
<thead>
<tr>
<th>Ports 1,2,3,4</th>
<th>Ports 5,6,7,8</th>
</tr>
</thead>
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<tr>
<td>Polarization</td>
<td>± 45°</td>
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<td>Average gain over all tilts, dBi</td>
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<tr>
<td>Horizontal beamwidth (HBW), degrees</td>
<td>360°</td>
</tr>
<tr>
<td>Vertical beamwidth, (VBW), degrees</td>
<td>80°</td>
</tr>
<tr>
<td>Electrical downtilt (EDT) range, degrees</td>
<td>0° (FET)</td>
</tr>
<tr>
<td>Maximum VSWR/return loss, dB</td>
<td>1.5:1/-14.0</td>
</tr>
<tr>
<td>Max PIM (3rd order 2x20 W carrier dBC)</td>
<td>-153</td>
</tr>
<tr>
<td>Maximum input power per port, watts</td>
<td>250</td>
</tr>
<tr>
<td>Total Max Composite Power, watts</td>
<td>900</td>
</tr>
</tbody>
</table>

## Electrical Specification (minimum/maximum)

<table>
<thead>
<tr>
<th>Ports 9,10,11,12</th>
<th>Ports 13,14, 15,16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polarization</td>
<td>± 45°</td>
</tr>
<tr>
<td>Average gain over all tilts, dBi</td>
<td>5.0</td>
</tr>
<tr>
<td>Horizontal beamwidth (HBW), degrees</td>
<td>360°</td>
</tr>
<tr>
<td>Vertical beamwidth (VBW), degrees</td>
<td>28°</td>
</tr>
<tr>
<td>Electrical downtilt (EDT) range, degrees</td>
<td>0° (FET)</td>
</tr>
<tr>
<td>X polar isolation, P2P, dB</td>
<td>25</td>
</tr>
<tr>
<td>Maximum VSWR/return loss, dB</td>
<td>1.5:1/-14.0</td>
</tr>
<tr>
<td>PIM</td>
<td>N/A</td>
</tr>
<tr>
<td>Maximum input power port</td>
<td>10</td>
</tr>
</tbody>
</table>

*USL at 5150-5925 MHz < -15dB at > 30° above horizon

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# Product Specifications

## CX16OMI236-1C

**NWAV™ X-Pol OMNI Cantenna | 16-Port | 2.98 cu. ft | 360°**

### Mechanical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions height/diameter, inches (mm)</td>
<td>35.4/14 (947/355)</td>
</tr>
<tr>
<td>Volume (cubic feet)</td>
<td>2.98</td>
</tr>
<tr>
<td>No. of RF input ports, connector type and location</td>
<td>16 x 4.3-10 female, bottom</td>
</tr>
<tr>
<td>RF connector torque</td>
<td>96 lbf·in (10.85 N m or 8 lbf·ft)</td>
</tr>
<tr>
<td>Net antenna weight, lb (kg)</td>
<td>35 (15.9)</td>
</tr>
<tr>
<td>Rated wind survival speed, mph (km/h)</td>
<td>150 (241)</td>
</tr>
<tr>
<td>Frontal wind loading @ 160 km/h, lbf (N)</td>
<td>58.7 (261.2)</td>
</tr>
<tr>
<td>Equivalent flat plate @100 mph and Cd=2, sq ft</td>
<td>1.17</td>
</tr>
</tbody>
</table>

### Ordering information

<table>
<thead>
<tr>
<th>Antenna model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX16OMI236-1C</td>
<td>2F X-Pol 16P OMNI 360°, HB 2-8° RET, 4.3-10</td>
</tr>
</tbody>
</table>

**Mounting bracket options**

Notes on cylinder brackets:

- All CX* antennas come with the bottom mount bracket (marked as ①) factory installed (all factory testing is done with bracket attached).
- Hardware is included with each antenna to connect bottom bracket to different mounting systems.
- JMA cylinder brackets are compatible with bottom mount via universal cantenna mount sleeve (marked as ②) included with JMA cylinder mounting systems.

Mounting details

Included with antenna:
7/8” bolt, washer, nut (Torque to 202 lbf-ft)

Sold separately:
Universal cantenna mount sleeve for JMA cylinder brackets (SC-BKT-SLA)

Small Cell solutions and mounting systems

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Arm Mounting System</td>
<td>SC-BKT-SA-(color)</td>
</tr>
<tr>
<td>Steel Pole Mounting System</td>
<td>SC-BKT-SLA-(color)</td>
</tr>
<tr>
<td>Wide Diameter Pole</td>
<td>SC-BKT-WTPE-(color)</td>
</tr>
<tr>
<td>Rooftop Ballasted Mounting System</td>
<td>SC-BKT-RTB-(color)</td>
</tr>
</tbody>
</table>
Product Specifications
CX16OMI236-1C
N WAV™ X-P ol OMNI Cantenna | 16-Port | 2.98 cu. ft | 360°

Remote electrical tilt (RET 1000) information

<table>
<thead>
<tr>
<th>RET location</th>
<th>Integrated into antenna</th>
</tr>
</thead>
<tbody>
<tr>
<td>RET interface connector type</td>
<td>8-pin AISG connector per IEC 60130-9 (Hand tight only)</td>
</tr>
<tr>
<td>RET Connector torque</td>
<td>Min. .5 Nm to max 1.0 Nm (hand pressure &amp; finger tight connector)</td>
</tr>
<tr>
<td>RET interface connector quantity</td>
<td>2 pairs of AISG male/female connectors</td>
</tr>
<tr>
<td>RET interface connector location</td>
<td>Bottom of the antenna</td>
</tr>
<tr>
<td>Total No. of internal RETs high bands</td>
<td>1</td>
</tr>
<tr>
<td>RET input operating voltage, vdc</td>
<td>10–30</td>
</tr>
<tr>
<td>RET max power consumption, idle state, W</td>
<td>≤ 2.0</td>
</tr>
<tr>
<td>RET max power consumption, normal operating conditions, W</td>
<td>≤ 13.0</td>
</tr>
<tr>
<td>RET communication protocol</td>
<td>AISG 2.0/3GPP</td>
</tr>
</tbody>
</table>

RET topology

A single RET device controls all 3 sectors via the designated external AISG connector as shown below

Array topology

<table>
<thead>
<tr>
<th>Array ID</th>
<th>Band</th>
<th>RF Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>698–960</td>
<td>1–2</td>
</tr>
<tr>
<td>R2</td>
<td>698–960</td>
<td>3–4</td>
</tr>
<tr>
<td>Y1</td>
<td>1695–2700</td>
<td>5–6</td>
</tr>
<tr>
<td>Y2</td>
<td>1695–2700</td>
<td>7–8</td>
</tr>
<tr>
<td>V1</td>
<td>3550–3700</td>
<td>9–10</td>
</tr>
<tr>
<td>V2</td>
<td>3550–3700</td>
<td>11–12</td>
</tr>
<tr>
<td>V3</td>
<td>5150–5925</td>
<td>13–14</td>
</tr>
<tr>
<td>V4</td>
<td>5150–5925</td>
<td>15–16</td>
</tr>
</tbody>
</table>

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Radio Description
Radio 8843

Description
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3.4 Acoustic Noise  
3.5 Environmental Characteristics  
3.6 Power Characteristics  
3.7 System Characteristics  

4 Hardware Architecture  
4.1 Radio Overview  
4.2 Optical Indicators and Buttons  

5 Connection Interfaces  
5.1 Antenna Interface  
5.2 Grounding Interface  
5.3 ~48 V DC Power Supply Interface  
5.4 Maintenance Button  
5.5 Optical Indicators  
5.6 Ext Alarm Interface  
5.7 ALD Ctrl Interface  
5.8 Interface for Optical Cable to Main Unit  

6 Standards and Regulations  
6.1 Regulatory Approval  
6.2 Other Standards and Regulations
1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

**Note:** Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.
2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

An optic cable connects the radio to the Radio System main unit or an expanded macro Radio System. The radios can be connected in a star configuration or in a cascade configuration with optical cable links. An overview of different radio installations is shown in Figure 1.
2.1 **Main Features**

The following are the main features of the radio:

- 2- and 3-wire power connections. For 2-wire power solutions, a DC adapter is used.
- LTE.
- Frequency Division Duplex (FDD).
- Dual band: B2 and B66A
- Duplex transmitter/receiver branches, for each frequency band (8TX/8RX).
- Up to 10.1 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range (MR) and Wide Area (WA). The relevant standards are listed in *Radio Standards Compliance* on page 26.
### Table 1 Radio 8843 Technical Data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum nominal output power</td>
<td>4×40 W (B2) + 4×40 W (B66A) or 2×60 W (B2) + 2×80 W (B66A) or 4×20 W (B2) + 4×60 W (B66A) (License key is required for total power over 4×5 W.)</td>
</tr>
<tr>
<td>Number of carriers per branch</td>
<td>Maximum 3 per port</td>
</tr>
<tr>
<td>Number of carriers per radio</td>
<td>Up to 24 per radio over both bands</td>
</tr>
<tr>
<td>Frequency</td>
<td>1850–1910 MHz uplink 1930–1990 MHz downlink B2 1710–1780 MHz uplink 2110–2180 MHz downlink B66A</td>
</tr>
</tbody>
</table>

**Dimensions**

<table>
<thead>
<tr>
<th>Height</th>
<th>380 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>335 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>277 mm</td>
</tr>
</tbody>
</table>

**Weight**

| Radio 8843  | 32.6 kg |

**Color**

<table>
<thead>
<tr>
<th>Body</th>
<th>NCS S 1002-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>NCS S 6502-B</td>
</tr>
</tbody>
</table>

(1) Detailed information about LTE licences can be found in Manage Licenses and Hardware Activation Codes in the Radio Node libraries.

(2) Detailed information about output power can be found in applicable Output Power Feature Description.
(3) Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.

**Figure 2** Radio 8843 Height, Width, and Depth

**Figure 3** Radio 8843 to Rail Measurement

### 3.1 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.
3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples for these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.

3.1.3 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.1.3.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal commercially available one or two component paints.
- Never use metallic paint or paint containing metallic particles.
Ensure that ventilation and drainage holes are free from paint.

Ensure proper adhesion of the paint.

3.1.3.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.

- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.

- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.

- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.2 Installation Alternatives

![Figure 4 Installation Alternatives](image_url)

Table 2 Key to Installation Alternatives

<table>
<thead>
<tr>
<th>Installation Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Wall installation</td>
</tr>
<tr>
<td>B</td>
<td>Pole installation</td>
</tr>
<tr>
<td>C</td>
<td>Pole installation with single pole clamp</td>
</tr>
</tbody>
</table>
3.3 Space Requirements

3.3.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

3.3.2 Pole or Mast Installation

![Radio Pole Installation Requirements Diagram]

*Figure 5  Radio Pole Installation Requirements*
To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a single pole, or a dual pole installation. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

**Note:** A radio cannot be installed in the uppermost position of a pole or mast.

### 3.3.3 Rail Installation on Wall

This section describes the installation requirements when installing the radio on a wall.
3.3.3.1 **Radio Installation on Outdoor Wall**

![Diagram of radio installation on outdoor wall](image)

**Figure 6  Radio Outdoor Wall Installation Requirements**

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.
3.3.3.2 Radio Installation on Indoor Wall

Figure 7  Radio Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

3.4 Acoustic Noise

Table 3  Sound Power Level

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Radio 8843 Sound Power Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; +25</td>
<td>45</td>
</tr>
</tbody>
</table>
### 3.5 Environmental Characteristics

This section contains operating environment data for the radio.

#### 3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>−40 to +55 °C</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>≤ 1,120 W/m²</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5–100%</td>
</tr>
<tr>
<td>Absolute humidity</td>
<td>0.26–40 g/m³</td>
</tr>
<tr>
<td>Maximum temperature change</td>
<td>1.0°C/minute</td>
</tr>
<tr>
<td>Maximum wind load at 50 m/s (pole installed single case)</td>
<td>260 N (front)</td>
</tr>
</tbody>
</table>

(1) Depending on installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

#### 3.5.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

*Table 4 Radio Heat Dissipation*

<table>
<thead>
<tr>
<th>Unit</th>
<th>Output Power</th>
<th>Maximum Heat Dissipation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio 8843</td>
<td>4×40 W (B2) + 4×40 W (B66A)</td>
<td>1.2 kW</td>
</tr>
<tr>
<td></td>
<td>2×60 W (B2) + 2×80 W (B66A)</td>
<td>1.1 kW</td>
</tr>
<tr>
<td></td>
<td>4×20 W (B2) + 4×60 W (B66A)</td>
<td>1.2 kW</td>
</tr>
</tbody>
</table>
3.5.3 Vibration

This section describes the radio tolerance to vibrations. The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)  
50 m/s² within 2–5 Hz for DR=2%

Frequency range  
1–35 Hz

Time history signal  
Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh

Random vibration, normal operation  
0.3 m²/s³

3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials’ fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is −48 V DC. The radio has two DC plugs.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Values and Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>−48 V DC</td>
</tr>
<tr>
<td>Operating voltage range(1)</td>
<td>−40 to −58.5 V DC</td>
</tr>
</tbody>
</table>
Conditions | Values and Ranges
--- | ---
Non-destructive range | 0 to −60 V DC

(1) The operating voltage range refers to the voltage at the radio power input port.

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation. The radio is designed for 3-wire power connections. For 2-wire power solutions, a DC adapter is used.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) Surge Protection Device (SPD) to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating could be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

**Table 6  **External Radio Fuse and Circuit Breaker Recommendations per DC Input

<table>
<thead>
<tr>
<th>Unit (DC Powered)</th>
<th>Output Power</th>
<th>Minimum Fuse Rating (1)</th>
<th>Fuse Rating Recommended for Reliable Operation (2)</th>
<th>Maximum Allowed Fuse Rating (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio 8843</td>
<td>4×40 W (B2) + 4×40 W (B66A)</td>
<td>26 A</td>
<td>28 A</td>
<td>32 A</td>
</tr>
<tr>
<td></td>
<td>2×60 W (B2) + 2×80 W (B66A)</td>
<td>26 A</td>
<td>28 A</td>
<td>32 A</td>
</tr>
<tr>
<td></td>
<td>4×20 W (B2) + 4×60 W (B66A)</td>
<td>26 A</td>
<td>28 A</td>
<td>32 A</td>
</tr>
</tbody>
</table>

(1) The radio is designed for 3-wire power connections. For 2-wire power solutions, a DC These fuse ratings can only be used if it is acceptable that fuses trip because of lightning or network transients.

(2) The recommended fuse rating takes into account that external fuses are not to trip because of lightning or network transients.

(3) The absolute maximum fuse class in accordance with radio design restrictions.

**Note:** If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules in −48 V DC Power Supply Interface on page 22 are to be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met.
3.6.2 **AC Power Characteristics**

The radio installation accepts 100–250 V AC when used together with an optional PSU. For more information about the PSU, refer to *PSU Description*.

3.6.3 **Power Consumption**

For information on power consumption, refer to *Power Consumption Calculations*.

3.7 **System Characteristics**

This section describes the system characteristics of the Radio System.

3.7.1 **RF Electromagnetic Exposure**

For general information about Radio Frequency (RF) Electromagnetic Fields (EMF), refer to *Radio Frequency Electromagnetic Fields*.

For information about radio access specific compliance boundaries for electromagnetic exposure, refer to *Radio Frequency Electromagnetic Exposure*.

3.7.2 **Software**

Information on software dependencies can be found in *Radio Software Support*.

3.7.3 **Radio Configurations**

For information about available radio configurations, refer to *RBS Configurations*. 
4 Hardware Architecture

For a description of the supported radio configurations, refer to RBS Configurations.

Figure 8 DC Adapter and Radio Components

Table 7 Key to DC Adapter and Radio Components

<table>
<thead>
<tr>
<th>Position</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DC adapter for 2-wire connector</td>
</tr>
<tr>
<td>B</td>
<td>Radio</td>
</tr>
</tbody>
</table>

4.1 Radio Overview

The radio contains most of the radio processing hardware. The following sections describe the components inside the radio.

4.1.1 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion
• RF modulation and demodulation
• Optical cable interface termination
• Two receivers for RX diversity
• RET modem (the antenna system communication link)

4.1.2 PA
The Multi Carrier Power Amplifier (MCPA) is the linear power amplifier for the RF carriers. The radio has eight MCPAs, one for each RF port.

4.1.3 FU
The Filter Unit (FU) consists of band-pass filters. In the radio, the FU also provides the following:
• Power and supervision for the TMA, or the RIU
• Voltage Standing Wave Ratio (VSWR) supervision

4.1.4 DC SPD
The DC SPD board protects the DC power input from lightning currents.

4.1.5 ALD (RET) SPD
An SPD provides overvoltage or overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD
An SPD provides overvoltage or overcurrent protection for the external alarm ports.

4.2 Optical Indicators and Buttons
The radio is equipped with optical indicators that show system status. The radio optical indicators are located under the maintenance cover. The fan unit optical indicators are located under a cover.
**Figure 9**  Radio Optical Indicators and Buttons for Radio 8843

**Table 8**  Description of Radio Optical Indicators and Buttons

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Maintenance button</td>
<td>–</td>
</tr>
<tr>
<td>B</td>
<td>Fault</td>
<td>!</td>
</tr>
<tr>
<td>C</td>
<td>Operational</td>
<td>✔</td>
</tr>
<tr>
<td>D</td>
<td>Maintenance</td>
<td>🤿</td>
</tr>
<tr>
<td>E</td>
<td>Interface 1</td>
<td>🍃</td>
</tr>
<tr>
<td></td>
<td>Interface 2</td>
<td>🍃</td>
</tr>
</tbody>
</table>

For more information about the behavior of the optical indicators and the maintenance button, refer to *Indicators, Buttons, and Switches*. 
5 Connection Interfaces

Figure 10 Radio 8843 Connection Interfaces

Table 9 Radio Connection Interfaces

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
<th>Marking</th>
<th>Connector Types</th>
<th>Cable Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Antenna A(1)</td>
<td>A</td>
<td>4.3-10 Plus</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Antenna B</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Antenna C</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Antenna D</td>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Antenna E(1)</td>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Antenna F</td>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Antenna G</td>
<td>G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Antenna H</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Grounding</td>
<td>✓</td>
<td>2 x M6 bolt</td>
<td></td>
</tr>
</tbody>
</table>
5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. RF cables connect the radio to the antenna.

Table 10 Radio Antenna Connection Interface Characteristics

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>RF Cable Type</th>
<th>Cable Connector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3-10 Plus, insert-receiver type</td>
<td>50 Ω coaxial</td>
<td>4.3-10 type</td>
</tr>
</tbody>
</table>

(1) Antenna A and E can be used for connecting RET or TMA.
Table 11  Radio Antenna Cable Connectors

<table>
<thead>
<tr>
<th>Radio Connectors</th>
<th>Antenna Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  (Antenna A)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>B  (Antenna B)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>C  (Antenna C)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>D  (Antenna D)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>E  (Antenna E)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>F  (Antenna F)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>G  (Antenna G)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>H  (Antenna H)</td>
<td>TX/RX</td>
</tr>
</tbody>
</table>

Antenna A and Antenna E can be used for connecting RET or TMA.

When configured for 2×60W (B2) + 2×80W (B66A), the following ports are used.

Table 12  2×60W + 2×80W Configuration

<table>
<thead>
<tr>
<th>Radio Connectors</th>
<th>Configured Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna A</td>
<td>B2</td>
</tr>
<tr>
<td>Antenna D</td>
<td></td>
</tr>
<tr>
<td>Antenna E</td>
<td>B66A</td>
</tr>
<tr>
<td>Antenna H</td>
<td></td>
</tr>
</tbody>
</table>

5.2 Grounding Interface

The radio must be grounded to protect it from overvoltage and lightning strikes. The grounding interface on the radio accepts an M6 dual cable lug on a coated cable.

For more information about grounding principles, refer to Grounding Guidelines for RBS Sites.

5.3 −48 V DC Power Supply Interface

Note: This product has two power connectors. Both power cables must be connected.
The –48 V DC power connector for incoming power accepts cables with various cross-sectional areas, depending on the cable length and the radio maximum power consumption. For more information on –48 V DC power cable dimensions, refer to Main-Remote Installation Products Overview.

The power cable conductor has a wire for the 0 V DC conductor, and a wire for the –48 V DC conductor. The color codes are market-dependent for both wires.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding interface in the power supply equipment, otherwise the radio overvoltage and lightning protection does not function properly.

5.4 Maintenance Button

The maintenance button is at the left of the ⚠ symbol.

More information about the maintenance button can be found in Indicators, Buttons, and Switches.

5.5 Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in Indicators, Buttons, and Switches.

5.6 Ext Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.7 ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the radio for antenna system communication.

5.8 Interface for Optical Cable to Main Unit

The Ⓜ 1 and Ⓜ 2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. A Small Form-factor Pluggable (SFP)+ is used to connect the optical cable to the radio.

**Note:** The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).
Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC/EN 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, refer to *SFP Module Selector Guide* and *Main-Remote Installation Products Overview* for more information.
6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity.

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- North American market requirements.

6.1.1 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

**North America**

- UL 62368-1
- CSA-C22.2 No. 62328-1

6.1.1.1 Outdoor Specific Requirements

The Radio complies with the following outdoor specific requirements:

**North America**

- UL 50E
- UL 60950-22
- CAN/CSA-C22.2 No. 60950-22

6.1.2 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:
North America

- FCC CFR 47 Part 15 B

### 6.1.3 Radio Standards Compliance

The Radio System complies with the following radio standards:

**North America**

- FCC CFR 47 Part: 2, 22, 24, 27, 30, 90 (US Band/Frequency Specific)

### 6.1.4 Marking

To show compliance with legal requirements, the product is marked with the following labels:

**North America**

- cETLus
- FCC CFR 47 Part 15 Statement
- FCC ID

### 6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory requirements.

#### 6.2.1 Spare Parts

This radio complies with the Ericsson Serviceability and Spare Parts Strategy.

#### 6.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3.

#### 6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.
Radio Description

Radio 4449

Description
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3.4 Environmental Characteristics  
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5.4 Interface for Optical Cable to Main Unit  
5.5 ~48 V DC Power Supply Interface  
5.6 Grounding Interface  
5.7 Ext Alarm Interface  
5.8 ALD Ctrl Interface  

6 **Standards and Regulations**  
6.1 Regulatory Approval  
6.2 Other Standards and Regulations
1 Introduction

1.1 Warranty Seal

The unit is equipped with two warranty seal stickers.

Note: Seals that have been implemented by Ericsson shall not be broken or removed, as it otherwise voids warranty.
2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets.

An optical cable connects the radio to the Radio System main unit or an expanded macro Radio System. The radios can be connected in a star configuration or in a cascade configuration with optical cable links.
2.1 Main Features

The following are the main features of the radio:

- 2- and 3-wire power connections. For 2-wire power solutions, DC adapters are used.
- Dual-band
- Both frequency bands available on each antenna port
- Long Term Evolution (LTE).
• Frequency Division Duplex (FDD).
• Duplex transmitter/receiver (4TX/4RX, 2TX/4RX and 2TX/2RX) branches.
• Up to 10.1 Gbit/s CPRI (optical)
• Complies with 3GPP base station class Wide Area (WA); relevant standards are listed in Radio Standards Compliance on page 25.
### Table 1 Radio 4449 Technical Data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum nominal output power(^{(1)})(^{(2)})</td>
<td>B5: 4\times40 W, B13: 4\times40 W</td>
</tr>
<tr>
<td></td>
<td>B5: 2\times60 W, B13: 2\times60 W</td>
</tr>
<tr>
<td></td>
<td>(License key is required for total output power over 2\times10 W.)</td>
</tr>
<tr>
<td>Number of carriers per branch</td>
<td>B5: Up to three carriers</td>
</tr>
<tr>
<td></td>
<td>B13: Up to one carrier</td>
</tr>
<tr>
<td>Number of carriers per radio</td>
<td>Up to 16 carriers</td>
</tr>
<tr>
<td>Frequency(^{(3)})</td>
<td>824–849 MHz uplink</td>
</tr>
<tr>
<td></td>
<td>869–894 MHz downlink</td>
</tr>
<tr>
<td></td>
<td>B5 for LTE</td>
</tr>
<tr>
<td></td>
<td>777–787 MHz uplink</td>
</tr>
<tr>
<td></td>
<td>746–756 MHz downlink</td>
</tr>
<tr>
<td></td>
<td>B13 for LTE</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>455 mm</td>
</tr>
<tr>
<td>Width</td>
<td>335 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>240 mm</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>Radio 4449</td>
<td>32 kg</td>
</tr>
<tr>
<td>Color</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td>NCS S 1002-B</td>
</tr>
<tr>
<td>Front</td>
<td>NCS S 6502-B</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Detailed information about LTE licences can be found in License Management or Manage Licenses.

\(^{(2)}\) Detailed information about output power can be found in applicable Output Power User Guide.

\(^{(3)}\) Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.
3.1 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6.
This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples for these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.

3.1.3 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.1.3.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal commercially available one or two component paints.
- Never use metallic paint or paint containing metallic particles.
- Ensure that ventilation and drainage holes are free from paint.
- Ensure proper adhesion of the paint.
3.1.3.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.2 Space Requirements

![Installation Alternatives](image)

**Figure 4 Installation Alternatives**

<table>
<thead>
<tr>
<th>Installation Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Wall installation</td>
</tr>
<tr>
<td>B</td>
<td>Pole installation</td>
</tr>
<tr>
<td>C</td>
<td>Pole installation with single pole clamp</td>
</tr>
</tbody>
</table>

**Table 2 Key to Installation Alternatives**

3.2.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area.
Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

### 3.2.2 Pole or Mast Installation

![Radio Pole Installation Requirements](Image)

Figure 5  Radio Pole Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a single pole, or a dual pole installation. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.
Allow for a minimum of 40 mm free space between radios installed side by side on the rail.

**Note:** A radio cannot be installed in the uppermost position of a pole or mast.

### 3.2.3 Rail Installation on Wall

This section describes the installation requirements when installing the radio on a wall.
3.2.3.1 Radio Installation on Outdoor Wall

Figure 6  Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail.
3.2.3.2 Radio Installation on Indoor Wall

Figure 7 Radio Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. The minimum distance from the top of the radio to the ceiling and the bottom of the radio to the floor is 300 mm.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail.

3.3 Acoustic Noise

The radio may emit low levels of acoustic noise when operating on low capacity in LTE.
3.4 Environmental Characteristics

This section contains operating environment data for the radio.

3.4.1 Operating Environment

The following are the values for the normal operating environment of the radio:

- Temperature $^{(1)}$: $-40$ to $+55$ °C
- Solar radiation: $\leq 1,120$ W/m²
- Relative humidity: 5–100%
- Absolute humidity: $0.26$–$40$ g/m³
- Maximum temperature change: $1.0$ °C/min
- Maximum wind load at 50 m/s (pole installed single case): $260$ N (front)

$^{(1)}$ Depending on installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

3.4.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation. Indoor installation in a room without adequate ventilation and cooling must be avoided.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Radio Heat Dissipation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Output Power (W)</td>
</tr>
<tr>
<td>Radio 4449</td>
<td>4×40 W, 2×60 W</td>
</tr>
</tbody>
</table>

3.4.3 Vibration

This section describes the radio tolerance to vibrations. The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

- Maximum level of Required Response Spectrum (RRS): $50$ m/s² within 2–5 Hz for DR=2%
- Frequency range: 1–35 Hz
- Time history signal: Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh.
3.4.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.5 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.5.1 DC Power Characteristics

The power supply voltage for the radio is −48 V DC.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Values and Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>−48 V DC</td>
</tr>
<tr>
<td>Operating voltage range&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>−38.0 to −58.5 V DC</td>
</tr>
<tr>
<td>Non-destructive range</td>
<td>0 to −60 V DC</td>
</tr>
</tbody>
</table>

<sup>(1)</sup> The operating voltage range refers to the voltage at the radio power input port.

The radio is designed for 3-wire power connections. For 2-wire power solutions, DC adapters are used.

The radio has two power connectors. Both power connections must be connected and operational for the radio to operate.

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.
The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) Surge Protection Device (SPD) to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating could be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 5 External Radio Fuse and Circuit Breaker Recommendations

<table>
<thead>
<tr>
<th>Unit (DC Powered)</th>
<th>Output Power (W)</th>
<th>Minimum Fuse Rating (1) (A) per power feed</th>
<th>Fuse Rating Recommended for Reliable Operation (2) (A) per power feed</th>
<th>Maximum Allowed Fuse Rating (3) (A) per power feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio 4449</td>
<td>4×40 W, 2×60 W</td>
<td>20</td>
<td>25</td>
<td>32</td>
</tr>
</tbody>
</table>

(1) These fuse ratings can only be used if it is acceptable that fuses trip because of lightning or network transients.
(2) The recommended fuse rating takes into account that external fuses are not to trip because of lightning or network transients.
(3) The absolute maximum fuse class in accordance with radio design restrictions.

Note: If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules in 48 V DC Power Supply Interface on page 22 are to be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met.

3.5.2 AC Power Characteristics

The radio installation accepts 100–250 V AC when used together with an optional PSU. For more information about the PSU, refer to PSU Description.

3.5.3 Power Consumption

For information about power consumption, refer to Power Consumption Guideline for RBS 6000.

3.6 System Characteristics

This section describes the system characteristics of the Radio System.

3.6.1 RF Electromagnetic Exposure

For information about radio access specific compliance boundaries for electromagnetic exposure, refer to *Radio Frequency Electromagnetic Exposure*.

### 3.6.2 Software

Information on software dependencies can be found in *Radio Software Support*.

### 3.6.3 Radio Configurations

For information about available radio configurations, refer to *RBS Configurations*. 
4 Hardware Architecture

For a description of the supported radio configurations, refer to RBS Configurations.

![DC Adapter and Radio Components](image)

**Figure 8  DC Adapter and Radio Components**

**Table 6  Key to DC Adapter and Radio Components**

<table>
<thead>
<tr>
<th>Position</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DC adapter for 2-wire connector</td>
</tr>
<tr>
<td>B</td>
<td>Radio</td>
</tr>
</tbody>
</table>

4.1 Radio Overview

The radio contains most of the radio processing hardware. The following sections describe the components inside the radio.

4.1.1 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion
- Four receivers for RX diversity and Multiple Input Multiple Output (MIMO) operation
- Low Noise Amplifier
- Optical cable interface termination
- RET modem (the antenna system communication link)
- RF modulation and demodulation

4.1.2 PA

The Multi Carrier Power Amplifier (MCPA) is the linear power amplifier for the RF carriers. The radio has eight MCPAs, two for each RF port.

4.1.3 FU

The Filter Unit (FU) consists of low-noise amplifiers and band-pass filters. In the radio, the FU also provides the following:
- Power and supervision for the TMA, or the RIU
- Voltage Standing Wave Ratio (VSWR) supervision

4.1.4 DC SPD

The DC SPD board protects the DC power input from lightning currents.

4.1.5 ALD (RET) SPD

An SPD provides overvoltage or overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD

An SPD provides overvoltage or overcurrent protection for the external alarm ports.

4.2 Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status. The radio optical indicators are located under the maintenance cover.
Figure 9  Radio Optical Indicators and Buttons

Table 7  Description of Radio Optical Indicators and Buttons

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Maintenance button</td>
<td>–</td>
</tr>
<tr>
<td>B</td>
<td>Fault</td>
<td>!</td>
</tr>
<tr>
<td>C</td>
<td>Operational</td>
<td>✔️</td>
</tr>
<tr>
<td>D</td>
<td>Maintenance</td>
<td>✅</td>
</tr>
<tr>
<td>E</td>
<td>Interface 1</td>
<td>🔄</td>
</tr>
<tr>
<td></td>
<td>Interface 2</td>
<td></td>
</tr>
</tbody>
</table>

For more information about the behavior of the optical indicators and the maintenance button, refer to Indicators, Buttons, and Switches.
5 Connection Interfaces

Figure 10 Radio Connection Interfaces

Table 8 Description of Radio Connection Interfaces

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
<th>Marking</th>
<th>Connector Types</th>
<th>Cable Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Antenna A</td>
<td>A</td>
<td>4.3-10 connector</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>B</td>
<td>Antenna B</td>
<td>B</td>
<td></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>C</td>
<td>Antenna C</td>
<td>C</td>
<td></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>D</td>
<td>Antenna D</td>
<td>D</td>
<td></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>E</td>
<td>Maintenance button</td>
<td>–</td>
<td></td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>F</td>
<td>Optical indicators</td>
<td><img src="image6.png" alt="Image" /></td>
<td></td>
<td><img src="image7.png" alt="Image" /></td>
</tr>
<tr>
<td>G</td>
<td>Optical cable 1</td>
<td><img src="image8.png" alt="Image" /></td>
<td></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>H</td>
<td>Optical cable 2</td>
<td><img src="image10.png" alt="Image" /></td>
<td>LC (On SFP) with support for FullAXS</td>
<td><img src="image11.png" alt="Image" /></td>
</tr>
</tbody>
</table>

20
5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. RF cables connect the radio to the antenna.

Table 9  Radio Antenna Connection Interface Characteristics

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>RF Cable Type</th>
<th>Cable Connector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3-10, insert-receiver type</td>
<td>50 Ω coaxial</td>
<td>4.3-10 type</td>
</tr>
</tbody>
</table>

Table 10  Radio Antenna Cable Connectors

<table>
<thead>
<tr>
<th>Radio Connectors</th>
<th>Antenna Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 📢 (Antenna A)</td>
<td>TX/RX, AISG, High Power</td>
</tr>
<tr>
<td>B 📢 (Antenna B)</td>
<td>TX/RX</td>
</tr>
<tr>
<td>C 📢 (Antenna C)</td>
<td>TX/RX, AISG</td>
</tr>
</tbody>
</table>
Radio Connectors | Antenna Connectors
---|---
Dʻ (Antenna D) | TX/RX, High Power

5.2 Maintenance Button

The maintenance button is at the left of the symbol.

More information about the maintenance button can be found in Indicators, Buttons, and Switches.

5.3 Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in Indicators, Buttons, and Switches.

5.4 Interface for Optical Cable to Main Unit

The 1 and 2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. A Small Form-factor Pluggable (SFP)+ is used to connect the optical cable to the radio.

**Note:** The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC/EN 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, refer to SFP Module Selector Guide and Main-Remote Installation Products Overview for more information.

5.5 −48 V DC Power Supply Interface

The −48 V DC power connector for incoming power accepts cables with various cross-sectional areas, depending on the cable length and the radio
maximum power consumption. For more information on –48 V DC power
cable dimensions, refer to Main-Remote Installation Products Overview.

The power cable conductor has a wire for the 0 V DC conductor, and a wire for
the –48 V DC conductor. The color codes are market-dependent for both
wires.

All cables must be shielded. The shielding must be properly connected both to
the power connector and to the grounding interface in the power supply
equipment, otherwise the radio overvoltage and lightning protection does not
function properly.

5.6 Grounding Interface

The radio must be grounded to protect it from overvoltage and lightning
strikes. The grounding interface on the radio accepts an M6 dual cable lug on
a coated cable.

For more information about grounding principles, refer to Grounding
Guidelines for RBS Sites.

5.7 Ext Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.8 ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the radio for
antenna system communication.
6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for Radio 4449.

6.1 Regulatory Approval

6.1.1 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International
- IEC 62368-1

Europe
- EN 50 385
- EN 62368-1

North America
- Health Canada Safety Code 6
- UL 62368-1
- CSA-C22.2 No. 62328-1

6.1.1.1 Outdoor specific requirements

The Radio complies with the following outdoor specific requirements:

International
- IEC 60 529 (IP65)
- IEC 60 950-22
Europe
- EN 60 529 (IP65)
- EN 60 950-22

North America
- CSA-C22.2 No. 60950-22-07
- UL 50E
- UL 60950-22

6.1.2 EMC Standards Compliance
The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International
- 3GPP TS36.113
- 3GPP TS37.113

North America
- FCC CFR 47 Part 15 B
- IC ICES-003 B

6.1.3 Radio Standards Compliance
The Radio System complies with the following radio standards:

International
- 3GPP TS36.141
- 3GPP TS37.141
- 3GPP TS45.005
North America

- IC RSS-132, 133, 139, 130, 195, 199 (Canada Band/Frequency Specific)
- IC RSS-Gen (Canada)
- RSP-100 (Canada)
- FCC CFR 47 Part: 2, 22, 24, 27, 30, 90 (US Band/Frequency Specific)

6.1.4 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- cETLus
- FCC CFR 47 Part 15 Statement
- FCC ID
- IC ICES-003 Statement
- IC ID

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory requirements.

6.2.1 Spare Parts

This radio complies with the Ericsson Serviceability and Spare Parts Strategy.

6.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3 to A6 depending on product placement.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.
The micro Radio 2205 is part of the Ericsson Radio System portfolio. Radio 2205 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 2205 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 2205, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

The Radio 2205 support installations with integrated or external antenna systems and can by use of the versatile optical CPRI interface be connected to any of the efficient Ericsson Baseband LTE modules by use of star or cascade configurations supporting multi sector and multi band.

Radio 2205 support LTE with two duplex TX/RX branches. It is specifically designed to support LAA meaning that the maximum output power is limited to 316 mW per branch.
Below on the right side you see a picture of the Radio 2205 mounted on a lamp pole. The picture beside it shows the back part of the Radio 2205, the support system in which the wall mount and pole mount are integrated.

### Technical specification for Radio 2205

#### FREQUENCY BANDS
- Bands: 3GPP Band B46 (LAA-LTE)

#### HW CAPACITY
- Carrier capacity LTE: Up to 60 MHz
- IBW: 60 MHz
- MIMO: Yes, 2T2R
- Output power: Up to 2 x 316 mW

#### INTERFACE SPECIFICATIONS
- Antenna ports: 2 x 4.3-10 (f)
- CPRI: 2 x 2.5/5/10 Gbps (exchangeable SFP modules)
- Optical indicators: 6
- External alarms: 2
- Field ground: 1

#### MECHANICAL SPECIFICATIONS
- W x H x D: 200 mm x 200 mm x 100 mm, including mounting bracket and esthetic front cover
- Weight: < 4.5 kg
- Volume: 4 liter
- Mounting: Rail, wall and pole mount

#### ELECTRICAL SPECIFICATIONS
- Power Supply: -48 VDC or 100 - 250 VAC

#### ENVIRONMENTAL SPECIFICATIONS
- Normal operating temp.: -40 °C to +55 °C (cold start at -40 °C)
- Relative Humidity: 5 – 100%
- Environment: Outdoor class with IP65
Radio 2208 is part of the Ericsson Radio System portfolio. Radio 2208 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 2208 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 2208, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

Radio 2208 supports installations with integrated or external antenna systems and can by use of the versatile optical CPRI interface be connected to any of the efficient Ericsson Baseband modules by use of star or cascade configurations supporting multi-sector and multi-band.

Radio 2208 supports LTE TDD with two duplex TX/RX branches supporting up to 2 x 10 W output power.
Below on the right side you see a picture of Radio 2208 mounted on a lamp pole. The picture beside it shows the back part of Radio 2208, the support system in which the wall mount and pole mount are integrated.

### Technical specification for Radio 2208

<table>
<thead>
<tr>
<th>FREQUENCY BANDS</th>
<th>3GPP Band B41E, B48</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HW CAPACITY</strong></td>
<td></td>
</tr>
<tr>
<td>Carrier capacity LTE:</td>
<td>40MHz for B41E, 60MHz for B48</td>
</tr>
<tr>
<td>IBW:</td>
<td>40MHz for B41E, 60MHz for B48</td>
</tr>
<tr>
<td>MIMO:</td>
<td>Yes, 2T2R</td>
</tr>
<tr>
<td>Output power:</td>
<td>Up to 2 x 10 W</td>
</tr>
<tr>
<td><strong>INTERFACE SPECIFICATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Antenna ports:</td>
<td>2 x 4.3-10 (f)</td>
</tr>
<tr>
<td>CPRI:</td>
<td>2 x 2.5/5/10 Gbps (exchangeable SFP modules)</td>
</tr>
<tr>
<td>Optical indicators:</td>
<td>6</td>
</tr>
<tr>
<td>External alarms:</td>
<td>2</td>
</tr>
<tr>
<td>Field ground:</td>
<td>1</td>
</tr>
<tr>
<td><strong>MECHANICAL SPECIFICATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>W x H x D:</td>
<td>200 mm x 200 mm x 100 mm, including mounting bracket and esthetic front cover</td>
</tr>
<tr>
<td>Weight:</td>
<td>&lt; 4.5 kg</td>
</tr>
<tr>
<td>Volume:</td>
<td>4 liter</td>
</tr>
<tr>
<td>Mounting:</td>
<td>Rail, wall and pole mount</td>
</tr>
<tr>
<td><strong>ELECTRICAL SPECIFICATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Power Supply:</td>
<td>-48 VDC or 100 - 250 VAC</td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL SPECIFICATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Normal operating temp.:</td>
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</tr>
<tr>
<td>Relative Humidity:</td>
<td>5 – 100%</td>
</tr>
<tr>
<td>Environment:</td>
<td>Outdoor class with IP65</td>
</tr>
</tbody>
</table>