

WIRELESS POLE ATTACHMENT

LICENSE AGREEMENT

BETWEEN

AEP TEXAS
(TCC)

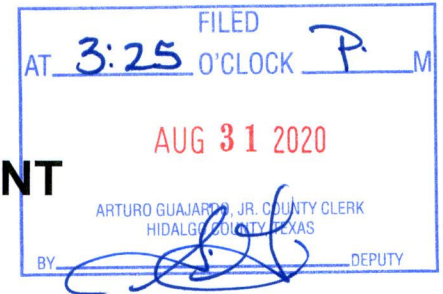
AND

COUNTY OF HIDALGO, TEXAS

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WIRELESS POLE ATTACHMENT LICENSE AGREEMENT



This Agreement is entered into as of September 1, 2020 between AEP Texas (tcc), a Delaware corporation (herein called "Owner"), and County of Hidalgo, Texas, a unit of local government in the State of Texas, Edinburg, Texas (herein called "Licensee").

Background Information

- A. Licensee is demanding access to Owner's poles pursuant to 47 U.S.C. §224 or any applicable federal and state laws and regulations, for the purpose of attaching certain wireless communications attachments and to install future attachments (hereinafter referred to as "Attachments") on Owner's distribution poles in accordance with the terms and conditions of this Agreement and for the purpose of Licensee engaging in wireless communication services within Owner's service territory.
- B. Owner is willing to comply with the mandatory access request of Licensee and permit Licensee on a non-exclusive basis to continue placing and maintaining the Attachments on said poles pursuant to the terms and conditions of this Agreement and any applicable federal and state laws and regulations.

Statement of Agreement

The parties acknowledge the accuracy of the above background information and in consideration of the promises and mutual covenants set forth herein agree as follows:

1. Scope of License

Owner shall grant to Licensee a revocable, non-exclusive and limited license to make attachments to Owner's distribution poles in accordance with the terms of this Agreement. Subject to the requirements of applicable law and upon compliance with the permitting requirements hereunder, Licensee shall only use the Attachment ("Attachment") as defined in detail on the "Attachment Fee Schedule", pg. 22 - hereof, at the power levels and frequencies approved by Owner, for its Represented Use as defined in Section 15 of this Agreement. Nothing in this Agreement shall be construed as a grant by Owner of an exclusive license, right or privilege to Licensee, nor as a limitation, restriction, or prohibition upon Owner's right to grant interests to third parties to the poles licensed hereunder.

All poles covered by this Agreement remain the property of Owner regardless of any payment by Licensee toward their cost. No use, however extended, of Owner's poles or payment of any fee or charge required hereunder shall create or vest in Licensee any claim of title, interest or ownership in such poles. Nothing in this Agreement shall be construed to compel Owner to construct, reconstruct, retain, extend, repair, place, replace or maintain any poles which, in Owner's sole discretion, is not needed for its own purposes. Owner and its successors and assigns shall have the right to operate, relocate and maintain its poles and attendant facilities in such a manner as will best enable it, in its sole discretion, to fulfill its service requirements.

2. Permitting

A. General Requirements

- i) Licensee shall submit a pole attachment construction proposal in a format acceptable to Owner (a "Proposal") prior to installing or modifying any Attachment (as defined in detail in the Attachment Fees Schedule, pg. 22) on any pole of Owner. However, Licensee shall not be required to submit a Proposal for any maintenance and/or repair of its existing facilities and Attachment so long as Licensee's maintenance and/or repair work does not change the location of Licensee's Attachment on Owner's pole or materially increase the weight, capacity, and/or tension of Licensee's Attachment on Owner's pole. The Proposal shall contain the pole number, if available and the number of poles to be attached, the position on the pole, and any other information Owner requests in order to determine Attachment compatibility with existing attachments located on the proposed pole and the impact such Attachment will have on the pole's loading, clearances, safety and reliability concerns.
- ii) Owner shall invoice Licensee for the total cost of a project or transaction, including all applicable materials, labor and overheads, and all actual or imputed time spent supervising any contractors employed for such project, with book value credit for any material actually salvaged by Owner ("Total Cost"), for all expenses Owner incurs that are associated with the preparation or review of any Engineering Reviews (as defined in Subsection B.i below) or Make Ready Estimates (as defined in subsection D.ii below). Licensee shall pay Owner in advance for any make ready work Owner elects to undertake. Any of the deadlines set forth within this Section 2 may be extended at Owner's option in cases where extensions in time for review and make ready are permitted pursuant to applicable state or federal law and regulations.
- iii) The billing for any make ready work undertaken by Owner shall be based upon the Make Ready Estimate, but Owner may issue supplemental invoices if the actual costs of such make ready work exceeds the Make Ready Estimate. Licensee may also request within sixty (60) days of the completion of any make ready work an accounting of the actual expenses incurred for such make ready work. If such actual expenses exceed the Make Ready Estimate, then Owner shall issue a supplemental invoice for such deficit and Licensee shall pay such supplemental invoice within forty-five (45) days of receipt. If such accounting indicates that the actual expense was less than the Make Ready Estimate, then Owner shall reimburse Licensee the excess within forty-five (45) days of such determination.
- iv) If a material change in the Make Ready Estimate occurs, Owner will use reasonable efforts to notify Licensee of such change; provided, however, that Owner's failure to do so will not relieve Licensee of its obligation to pay the Total Cost of all Make Ready work as required under this Section.

B. Review of Proposals

- i) Upon receipt of a complete Proposal, Owner shall have the option to review each pole Licensee seeks to occupy to determine whether such pole can accommodate the proposed Attachment ("Engineering Review") and to then notify Licensee

whether such Attachment can commence without modifications or rearrangement of the pole or whether certain actions must be undertaken prior to Licensee's construction of the proposed Attachment. Owner shall provide Licensee Notice within fifteen (15) days after submission of a Proposal if it believes the Proposal is incomplete or if Owner elects to forego conducting the Engineering Review.

- ii) If Owner elects to forego conducting the Engineering Review or has not completed it within forty-five (45) days of Owner's receipt of the Proposal, then Licensee shall submit such Proposal to a contractor which Owner has approved to conduct Engineering Reviews and make ready work (an "Approved Contractor"). Licensee shall notify Owner if an Approved Contractor has been utilized for such Engineering Review within fifteen (15) days of submission to such approved contractor.
- iii) Owner, or the Approved Contractor, shall then conduct such Engineering Review in accordance with all applicable design standards set forth within regulations or codes promulgated by any federal, state, local or other governmental authority having jurisdiction, the National Electrical Safety Code (NESC), and Owner's design standards (the "Standards"). Where one standard is more restrictive than the other standard, the most restrictive standard shall be applied. When an Approved Contractor is utilized, the Approved Contractor shall then submit such Engineering Review to Owner for further action and review.

C. Attachments Where No Make Ready Work is Necessary

- i) If the Engineering Review indicates that the proposed Attachment can be accommodated on the pole without any rearrangement of existing attachments or replacement of the pole and Owner concurs with the conclusions of the Engineering Review, then within fourteen (14) days after completing or receiving the Engineering Review, Owner shall provide Notice to Licensee that Licensee may proceed with construction ("Notice to Proceed") which Notice shall constitute Owner's written approval of the Attachment(s). Licensee may then proceed with the attachment of its facilities and shall give Notice to Owner of its completion of such attachment within thirty (30) days of completing the work. If Owner has not received Notice of such completion of the work within ninety (90) days of the Notice to Proceed, then Owner shall have the option, in its sole discretion, to cancel the Proposal.
- ii) If Owner does not cancel the Proposal, and does not receive Notice whether Licensee has constructed its proposed Attachments within ninety (90) days after Licensee's receipt of the Notice to Proceed, Owner may assume that such Attachment(s) have been constructed and the obligation for Licensee to pay Annual Attachment Fees (as defined in below for such proposed Attachment(s)) shall commence as of the date of the Notice to Proceed.

D. Attachments Where Make Ready Work is Required

- i) If the Engineering Review indicates that rearrangements of existing facilities in the communications space of the pole (forty inches below Owner's lowest electric equipment and above applicable ground clearance requirements (the "Communications Space")) will be required to accommodate Licensee's proposed

Attachment, then Owner may elect to provide Licensee a written cost estimate of making the pole ready (the "Make Ready Estimate") for attachment. If Owner fails to provide such Make Ready Estimate within fourteen (14) days after Owner's receipt of the completed Engineering Review, then Licensee shall engage an Approved Contractor to determine the Make Ready Estimate and provide to Owner for approval and upon Owner's approval of the Make Ready Estimate, Owner shall issue a Notice to Proceed with the Make Ready Estimate to Licensee.

- ii) If the Engineering Review indicates that rearrangements of Owner's electric facilities will be required to accommodate Licensee's proposed Attachment, then Owner shall prepare a Make Ready Estimate within fourteen (14) days of the completed Engineering Review setting forth the Total Cost, for the rearrangement of Owner's facilities, and confirm that the relevant Attachments will be authorized hereunder upon payment of the make ready estimate and the completion of the make ready work.
- iii) Within fourteen (14) days of Licensee's receipt of Owner's Make Ready Estimate, Licensee shall provide Notice to Owner of whether Licensee is electing to have such make ready work undertaken at Licensee's expense ("Election to Proceed with Make Ready"). If Licensee fails to respond within such fourteen (14) days with payment, then Owner may withdraw the Make Ready Estimate and Licensee must resubmit the Proposal.
- iv) Upon receipt of payment for the full amount of the Make Ready Estimate, Owner shall complete such make ready work within the time requirements set forth in applicable state or federal law. If Owner elects not to proceed with rearrangements or fails to complete rearrangements of facilities within the Communications Space within such state or federal required timelines, then Licensee may proceed with any legal remedies available to Licensee to rearrange third party communications facilities within the Communications Space. Licensee shall not make any attachments to poles identified as requiring make ready work until all such make ready work has been completed. If Owner does not complete rearrangement of facilities within the Communications Space within applicable state or federal required timelines and Licensee assumes control of make ready work pursuant to applicable state or federal law, Licensee shall provide Owner Notice of completion of the make ready work and attachment of Licensee Attachments within thirty (30) days after the attachment of Licensee's Attachments.
- v) If Owner has not received notice of such completion of the work within ninety (90) days of the issuance of the Notice to Proceed, then Owner shall have the option, in its sole discretion, to cancel the Proposal. If Owner does not cancel the Proposal and does not receive notice whether Licensee has constructed its proposed Attachments, Owner may assume that such Attachments have been constructed and the obligation for Licensee to pay Annual Attachment Fees for such proposed Attachments shall commence as of the date of the Notice to Proceed.

E. Attachments in the Power Space and Make Ready Work for Electric Facilities

- i) Except as specifically required by applicable state or federal law, and unless Owner otherwise elects (in its sole discretion) to permit Approved Contractors to rearrange Owner's electric facilities, Owner or its contractors shall perform all

rearrangements of Owner's electric facilities. If the Make Ready Estimate indicates that pole replacement will be necessary to accommodate Licensee's Proposed Attachment, then Owner shall determine (in its sole discretion) whether to proceed with such pole replacement, and unless the parties otherwise agree, Licensee shall pay the Total Cost of such poles replacement prior to Owner undertaking such work.

- ii) Unless Owner otherwise elects (in its sole discretion), Owner shall perform all work above the Communications Space (the "Power Space"), including installation or reconfiguration of the Attachment and any rearrangement of the pole within the Power Space. Owner shall prepare a Make Ready Estimate of the Total Cost Owner expects to incur to install the Attachment and undertake any rearrangement of the pole within the Power Space.
- iii) Included within such Make Ready Estimate shall be a notice by Owner whether Owner will be undertaking the work or whether Licensee must engage an Approved Contractor. If Licensee fails to respond within such fourteen (14) days, then Owner may cancel the Proposal, and Licensee shall be required to submit a new Proposal. If the Make Ready Estimate indicates that pole replacement will be necessary in order to accommodate the proposed Attachment, then Owner shall determine (in its sole discretion) whether to proceed with such pole replacement, and Licensee shall pay the Total Cost of such pole replacement prior to Owner or the Approved Contractor undertaking such work. Licensee shall be responsible for retaining the services of the Approved Contractor.
- iv) Any work performed by an Approved Contractor within the Power Space shall be undertaken in compliance with all Owners' access and tag out rules. Licensee shall give notice to Owner of its completion of such attachment within thirty (30) days of the Approved Contractor completing the work. If Owner has not received notice of such completion of the work within sixty (60) days of the Notice to Proceed, then Owner shall have the option, in its sole discretion, to cancel the Proposal. If Owner does not cancel the Proposal and does not receive notice whether Licensee has constructed its proposed Attachment, then Owner may assume that the Attachment has been constructed and the obligation for Licensee to pay Annual Attachment Fees (as defined below) for the Attachment shall commence as of the date of the Notice to Proceed.

3. Installation Standards

- A. All Attachments permitted by Owner shall be installed in a manner which does not interfere with the present or any future use which Owner may desire to make of its poles. Owner shall determine, in its sole discretion, whether the Attachment interferes with Owner's present or future pole use plans. All Attachments made hereunder shall be installed and maintained by Licensee in compliance with the Standards. Licensee shall identify the Attachment at each pole location using a tagging system approved by Owner.
- B. Licensee acknowledges that the poles licensed hereunder have energized facilities installed upon them and that working in the vicinity of energized facilities poses potential dangers. At all times during the term of this Agreement, and particularly during the time of any construction, repair, or maintenance of Attachments covered by

this Agreement, Licensee shall consider the electric wires of Owner to be energized. Licensee shall warn all of its employees, agents, contractors and subcontractors, or any other parties who may be working on behalf of the undersigned, of the potential dangers. Licensee shall take any necessary precautions by the installation of protective equipment, or other means, to protect all persons and property of all kinds against injury or damage occurring by reason of Licensee's Attachments on Owner's Poles.

4. Poles Installations

A. Poles Installed In New Locations:

- i. Where Owner desires to install a new pole in a location where facilities have not been previously placed, and Licensee desires to attach to such pole, Owner and Licensee shall follow the procedures set forth in Section 2. Owner shall make a determination of the size and height of the pole necessary to accommodate its facilities alone and shall calculate the Total Cost necessary to procure and install such pole. Owner shall then make a determination of the size and height of the pole necessary to accommodate both Owner's facilities and Licensee's Attachments. Licensee shall pay Owner the difference between the Total Cost of installing a pole to accommodate both Owner and Licensee(s) on a new pole (either as new construction or replacement of an existing pole at Owner's initiation) and the Total Cost of installing a pole that meets Owner's needs ("Incremental Cost"), if such applies. If other parties desire to attach to the same pole, then Licensee shall only be responsible for the Incremental Cost of the pole necessary to accommodate all parties, divided by the total number of attaching parties (exclusive of Owner).
- ii. Owner may set aside space on poles for future development needs consistent with applicable law and a *bona fide* development plan that reasonably and specifically projects and identifies a need for that space in the provision of its core utility service. Until such time as Owner has an actual need for such reserved space, Owner shall permit Licensee to use it for attachment of Licensee's Attachments, subject to Section 2 hereof. In the event Owner desires to reclaim such loaned space, Owner shall provide Notice to Licensee of the space reclamation. Upon such Notice, Licensee shall either remove its facilities from the loaned space within sixty (60) days of Owner's Notice, or pay the Total Cost of either (i) modifying the poles, if possible, to expand capacity necessary to continue the maintenance of Licensee's Attachments; or, if such expansion is not possible, (ii) replacing the pole with a pole which will accommodate all of the existing and planned attachments on the pole, including the cost of removing the old pole, and transferring the facilities of Owner and any other attaching party to the new pole. If Licensee is sharing such reclaimed loaned space with another attaching party, then Licensee and the other attaching party shall share the Total Cost of the project.

B. Pole Installed as Replacements:

- i. Where Owner must replace or relocate a pole and such replacement or relocation is not caused by the addition of new Licensee Attachment, Owner

shall provide Licensee reasonable advance Notice before undertaking such replacement or relocation. Licensee shall transfer its Attachment within ten (10) days of receiving Notice that the new pole is in place. If Licensee does not transfer its Attachment within such ten (10) days, then Owner may transfer the Attachment at Licensee's expense.

- ii. If Owner or another party is required to make a return trip to remove a pole as a result of Licensee failing to transfer its Attachment within the time set forth herein, then Licensee shall reimburse Owner or such third party for the Total Cost incurred by such return trip. The foregoing notwithstanding, however, if Licensee is delayed in transferring its Attachments due to the act or failure to act of any other entity with Attachments on Owner's poles, or for other reasons that are not the fault of Licensee or are beyond Licensee's reasonable control, then Licensee's obligation to transfer its Attachments will be excused for the period of the delay.

- C. General Issues: Licensee shall remain responsible for the Total Cost of all projects initiated by Owner as the result of a Licensee Proposal, regardless of whether Licensee elects to install the Attachment. Licensee shall be responsible for all engineering, inspection, and construction work undertaken by Owner on Owner's poles and on all third party owned poles where such work is initiated as a result of the proposed attachment of Licensee's facilities. Notwithstanding any requirement set forth in this Agreement, Owner may decline to expand the capacity of any of its poles facilities.

5. Rearrangement of Attachment

Licensee shall rearrange any of its Attachment installed hereunder in order to accommodate additional Owner or third party attachments. Such rearrangement shall be completed within sixty (60) days of receiving Notice to rearrange. If Licensee does not rearrange its Attachments within such sixty (60) days, then Licensee shall be deemed to have granted consent to Owner or the party seeking such rearrangement to rearrange Licensee's Attachment. The foregoing notwithstanding, where Owner seeks rearrangement of only Licensee's Attachments solely to accommodate Owner's facilities, Owner may request such relocation on an expedited basis by Notice to Licensee, and if Licensee does not rearrange its Attachments within thirty (30) days of receiving such Notice, it shall be deemed to have granted its consent for Owner to rearrange Licensee's relevant Attachments. If Licensee is delayed in rearranging its Attachments due to the act or failure to act of any other entity with Attachments on Owner's poles, or for other reasons that are beyond Licensee's reasonable control, then Licensee's obligation to rearrange its Attachments will be excused for the period of the delay.

6. Guying

Any guying required pursuant to the Standards shall be installed by and at the expense of Licensee. Licensee shall not use any of Owner's guys or anchors. Licensee shall install its guys and anchors prior to stringing any lines or messengers.

7. Frequency Operation

- A. Approved Frequencies. Licensee shall operate the Attachment at the frequencies and power levels set forth on Attachment Fee Schedule (Pg. 22). Licensee may only

change the Approved Frequencies pursuant to Owner's written consent, which consent shall not be unreasonably withheld. Any proposed change in frequency or power that materially increases rf emission exposure levels may be denied by Owner in its sole discretion. Licensee shall pay Owner upon invoicing the Total Cost incurred by Owner in reviewing any requested Approved Frequency changes.

- B. Interference. In the event that Owner installs any improvement upon a pole which materially interferes with the transmission or reception of Licensee's Attachment, then Licensee's sole remedy shall be to either remove the Attachment affected or terminate this Agreement effective as of the date of such interference.
- C. FCC Licensing. Licensee shall be responsible for obtaining and maintaining appropriate Federal Communications Commission ("FCC") authorization for the operation of the Attachment. Licensee shall provide Owner a copy of all such licensing and/or authorization prior to operating the Attachment, and shall provide Owner with copies of any modifications to or terminations of such licensing and/or authorization within five (5) days of receipt by Licensee.
- D. Interruption of Communication Attachment Use. Licensee shall install a mechanism upon the Attachment to permit Owner or any other party maintaining attachments on the same pole to interrupt use of the Attachment when Owner or a third party is accessing the pole. Owner or such third parties shall be permitted to terminate operation of any Attachment upon a reasonable determination by Owner or such third party that interruption is necessary in order to service the pole or attachments upon such pole. Owner shall further be permitted to rearrange or remove the Attachment during emergencies provided such removal or rearrangement is reasonably necessary to restore electric service in the area.

8. Post Construction Inspection

- A. Owner may conduct at Licensee's expense a post-construction inspection within one year of all new Attachment installations or modifications of existing Attachment. In addition, Owner may make additional inspections of the Attachment at Licensee's expense, if Owner has reasonable cause to believe that Licensee is not maintaining its Attachment in accordance with the Standards and the terms of this Agreement. Owner agrees to provide Licensee reasonable Notice of such post-construction inspection that allows Licensee a reasonable opportunity to participate in the inspection.
- B. Owner's right to make any inspections and any inspection made pursuant to such right shall not relieve Licensee of any responsibility, obligation or liability assumed under this Agreement to maintain its Attachment in accordance with the Standards and other prudent practices. If Owner finds that Licensee has not maintained any of its Attachments in accordance with the Standards and the terms of this Agreement, Owner shall provide Notice to Licensee, which notice shall include reasonable information concerning the claimed deficiencies found with respect to Licensee's Attachments, including pole number and location ("Notice of Violation").
- C. Within sixty (60) days after Licensee's receipt of any Notice of Violation, Licensee shall either submit a plan of correction or shall dispute the findings of such Notice of Violation with regard to some or all poles identified in the Notice of Violation by

providing Notice and supporting documentation to the Owner. If Licensee submits a plan of correction to Owner, Licensee shall provide notice of the correction to Owner within one hundred-eighty (180) days after Licensee's receipt of the Notice of Violation.

9. Inventory

- A. Owner may conduct at reasonable intervals yet not more often than once every three (3) years, complete field inventories of its poles for the purpose of verifying the number and location of all Attachments of Licensee in the area covered by this Agreement. Owner shall give to Licensee at least sixty (60) days prior Notice of such inventory and Licensee shall advise Owner if Licensee desires to participate (ride-along) in the inventory with Owner not less than fifteen (15) days prior to the scheduled date of such inventory. Licensee shall reimburse Owner for Owner's expenses incurred in making such inventory, whether or not Licensee participates provided, however, if such inventory also includes a review of attachments of other attaching parties (including Owner if applicable), the expenses of such inventory shall be reasonably allocated to all such attaching entities.
- B. Owner shall provide to Licensee reasonable information concerning the identification of Licensee's unauthorized Attachments, including pole number and location ("Inventory Report"). Within sixty (60) days after Licensee's receipt of such Inventory Report, Licensee may dispute its findings with regard to some or all poles identified in the Inventory Report by providing Notice and supporting documentation to the Owner on a pole by pole basis, including any pole numbers and locations Licensee disputes. If no Notice or supporting documentation is provided within the required timeframe, the inventory results shall be deemed conclusive. If Owner agrees that some or all of the unauthorized Attachments identified in the Inventory Report were in fact authorized Attachments, Owner shall notify Licensee in writing of its determination and shall revise the Inventory Report with regard to those Attachments. If, after reviewing Licensee's supporting documentation, Owner reasonably determines that some or all of the unauthorized Attachments identified in the Inventory Report are in fact unauthorized, Owner may order Licensee to permit such unauthorized Attachments pursuant to Section 2 above. Licensee shall at all times make and keep in full and complete form plats, maps and records showing the exact location of all Licensee's Attachments on Owner's Poles.

10. Unauthorized Attachments

- A. Except as otherwise specifically provided in this Agreement, any Attachment made by Licensee without the written approval of Owner pursuant to the terms of this Agreement, or any prior agreement governing such facilities, shall be considered an unauthorized attachment. Upon discovery of an unauthorized Attachment other than in an Attachment Inventory conducted pursuant to Section 9 above, Owner shall provide Notice to Licensee, which shall include the pole number and location. Within twenty (20) business days after Licensee's receipt of such Notice, Licensee may dispute the Notice with regard to some or all poles identified in it by providing a written response and supporting documentation to the Owner.
- B. If Owner agrees that some or all of the unauthorized Attachments identified in the Notice were in fact authorized Attachments, Owner shall notify Licensee in writing of its determination and shall revise the Notice with regard to those Attachments. If, after

- reviewing Licensee's supporting documentation, Owner reasonably determines that some or all of the unauthorized Attachments identified in the Notice are in fact unauthorized, Owner may order Licensee to permit such unauthorized attachments pursuant to Section 2 above. For each unauthorized Attachment discovered during an inventory or pursuant to Section A above, Licensee shall also pay Owner upon invoice an Unauthorized Attachment Fee (the "Unauthorized Attachment Fee") equal to six (6) times the Annual Attachment Fee applicable for the Contract Year during which the discovery of the unauthorized Attachment occurred.
- C. If Licensee fails to submit a Proposal under Section 2 above to permit its unauthorized Attachments within sixty (60) days of Owner's order to do so and then complete, in the time-frame set forth in Section 2 above, any required make ready work within the Communications Space that is identified by the Engineering Review, then upon invoice Licensee shall pay an additional Unauthorized Attachment Fee equal to seven (7) times the annual Attachment Fee applicable for the Contract Year which the discovery of the unauthorized Attachment occurred for each unauthorized Attachment that Licensee either failed to submit to Engineering Review or properly remedy. The payment of such additional Unauthorized Attachment Fees shall not relieve Licensee of its obligation to submit a Proposal for its unauthorized Attachments in accordance with Section 2. In no event shall Owner recover more than what is permissible under applicable federal or state law. Licensee shall also pay Owner all reasonable and documented non-recurring administrative expenses Owner incurs as a result of processing and documenting such Unauthorized Attachments.
 - D. Anything else in this Agreement notwithstanding, in no event shall any unauthorized Attachment later permitted pursuant to this Section 10 and Section 2 above constitute an event of default or non-compliance under Section 21 of this Agreement.

11. Interference or Hazard

- A. Whenever Owner notifies Licensee in writing or verbally with written confirmation, that any Attachment made hereunder does not comply with the Standards, Licensee shall within sixty (60) days of receiving such Notice, either remove such non-complying attachment, or bring such Attachment within compliance with the Standards. Such Notice to Licensee shall include reasonable information concerning the nature of the violations found and shall include the pole number and location. Within one hundred-eighty (180) days after receiving Owner's Notice, Licensee shall notify Owner in writing that the subject Attachment or Attachments have either been removed or corrected to comply with the Standards. If non-compliance of such Standards is causing a hazard, then Licensee shall undertake the remedial efforts set forth above in this Section within ten (10) days of receiving notice from Owner.
- B. All tree trimming required, on account of Licensee's attachment, shall be done by Licensee at its sole risk and expense and in a manner satisfactory to Owner.
- C. In the case of an emergency, which in Owner's reasonable judgment requires Owner to immediately remove or relocate the Licensee's Attachment, Owner may remove or relocate such Attachment as required, at Licensee's expense, without prior Notice or responsibility for any damage to Licensee caused by such removal or rearrangement; provided, however, that Owner shall endeavor to provide Notice to Licensee regarding

the emergency removal or relocation of Licensee's Attachments, including associated expenses, as soon as practical thereafter

12. Access to Power Space

Licensee shall only access the Power Space pursuant to the terms set forth within this Section 12 and as permitted pursuant to Section 2. Licensee shall provide Owner prior notice of thirty (30) days and follow the tag out and access rules set by Owner. Only Approved Electrical Contractors shall access the Power Space. Owner reserves the right to have Owner crews at the site during such access. Licensee shall reimburse Owner the Total Cost of any such monitoring. Owner's option to monitor Licensee access to the Power Space shall not relieve Licensee of any responsibility, obligation or liability assumed under this Agreement to maintain its Attachment in accordance with the Standards and other prudent practices.

13. Attachment Removal

Licensee may, at any time, abandon the use of a pole hereunder by giving Notice to Owner and removing from the pole all of its Attachments. Annual attachment fees shall continue to accrue until Licensee provides Notice to Owner that Licensee has removed its Attachment and Owner has confirmed.

14. Charges and Fees

- A. Non-Recurring Expenses: Except as otherwise set forth herein and subject to applicable law, Licensee shall reimburse Owner for the Total Cost of all non-recurring expenses incurred by Owner, which are caused by or reasonably attributable to Licensee's Attachment including Owner's review of Attachment specifications, rf conditions and Engineering Review from our Standards, Telecommunications, Engineering and other applicable resources for Licensee's specific Attachment.
- B. Initial Contact Fee: If applicable, Licensee agrees to pay Owner an initial Contact Fee as defined in the appropriate state tariff. No initial contact fee is required if Licensee has, at the effective date of this Agreement, paid an annual charge to Owner with respect to such poles(s), or in cases where poles are replaced.
- C. Annual Attachment Fee: Licensee agrees to pay Owner during the Initial Term an Annual Attachment Fee per Attachment as set forth and described in the "Annual Attachment Fee section", pg. 22, attached hereto and incorporated herein. Upon expiration of the Initial Term (as defined below) Owner may revise the Annual Attachment Fee pursuant to Section 14 below prior to the effective date of such revision or rate adjustment. Billing of annual charges shall be rendered, in advance, annually on or about July 1 of each year.
- D. General. Licensee shall pay the applicable Annual Attachment Fee, in arrears upon the next annual billing, for new Attachments made during the prior "Contract Year" (the preceding period of July 1 – June 30). There shall be no proration of fees hereunder, including adjustments in billing for attachment made or removed during the Contract Year.

- E. Revisions to Annual Attachment Fee: Upon the commencement of each new Contract Year the Annual Attachment Fee shall be increased three percent (3%). Licensee shall provide Notice to Owner, if Licensee believes such Annual Attachment Fee as adjusted herein exceeds the maximum Annual Attachment Fee permitted under state or federal law.

15. Electricity Use

Licensee shall be responsible for obtaining and promptly paying all utility charges for electricity, telephone service or any other utility consumed by Licensee. If Owner provides electricity, Licensee shall promptly pay Owner the applicable tariff rate for such service in addition to any fees described herein.

16. RF Exposure

It shall be the responsibility of Licensee to ensure that the addition of the Attachment does not cause radio frequency, and is properly tagged to the exposure levels of all of the current existing equipment located upon the pole and in the surrounding vicinity (including the Attachment, Owner's equipment, and all other transmitting equipment in the vicinity) to exceed those levels permitted by the FCC. Owner shall require other licensees installing equipment after the installation of the Attachment to bear the same responsibility. If it is determined that the radio frequency exposure levels at a pole and surrounding vicinity exceed exposure levels set by the FCC and the Attachment is part of the cause of such exposure issues, then Licensee shall immediately terminate operation of the Attachment and remove the Attachment located at that pole within thirty (30) days of being notified.

17. Time of Payment

Unless otherwise set forth herein, payments due hereunder shall be made within thirty (30) days from the date of the invoice. On all amounts not so paid, an additional charge for interest at the highest rate allowed by law. All invoices for make ready construction work shall be paid in advance of the commencement of such work. Licensee may dispute the amount of any bill, but shall not withhold payment of any amount in dispute. In the event a refund of any amount paid by Licensee is determined to be due (or in the event of the discovery of any other billing error) an adjustment to correct the billing error shall be made and applied to the Licensee's following year's Annual Pole Attachment Fee invoice. Non-payment by Licensee of any such amounts due Owner, when due, shall constitute a default under this Agreement and may cause forfeiture of the bond or security required by Section 20, to the extent of the nonpayment. Where the provisions of this Agreement require any payment by Licensee to Owner other than for the Annual Attachment Fee, Owner may, at its option, require that the estimated amount thereof be paid in advance of permission to use any pole or the performance by Owner of any work.

18. Indemnity

To the extent permitted by law, Licensee for itself and its contractors and subcontractors hereby releases Owner, its affiliates, and their respective directors, officers, employees and agents (collectively, "Indemnitees"), from any and all liability for loss of or damage to the Attachment and for any interruption to, or failure of, the service rendered by Licensee or others in which such Attachment is used. To the extent permitted by law, Licensee further hereby agrees to indemnify, hold harmless, and defend Indemnitees from and against any and all losses, liabilities, costs,

expenses, suits, actions, claims and all other obligations and proceedings whatsoever, including, without limitation, all judgments rendered against, and all fines and penalties imposed upon Indemnitees, and any reasonable attorneys' fees and any other costs of litigation (hereinafter collectively referred to as "liabilities") arising, directly or indirectly, out of the interruption or loss of Licensee's, its subscribers, affiliates, or sub licensees' services or because of any interference with communication reception of such services, or out of injuries to persons, including disease or death, or damage to property, or in any other way attributable to or arising either directly or indirectly out of, the attachment, installation, operation, presence, use, maintenance, or removal of Licensee's Attachment to Owner's Poles, or by the proximity of Licensee's Attachment to all other parties, including the Owner, occupying space on Owner's poles, except that Licensee's obligation to indemnify Indemnitees shall not apply to any liabilities to the extent arising from Indemnitees' sole negligence or willful misconduct. Indemnitees shall be free to select counsel of their choice for their defense hereunder.

Because Licensee may utilize contractors in the construction of its Attachment, Licensee hereto agrees to require its contractors and subcontractors to provide a release and indemnification of all claims for the benefit of the Indemnitees. If Licensee fails to obtain the appropriate release and indemnification from its contractor/subcontractor, Licensee hereby agrees to provide the same release and indemnification to Indemnitees by Licensee's contractor or subcontractor on their behalf.

It is further agreed between the parties hereto, that to the extent any of the provisions of this Section are determined to be contrary to law or held to be invalid by any court of competent jurisdiction, this Section shall be construed and applied as if such invalid provisions were not contained herein, attempting at all times to conform, to the extent possible, to the intent of the parties as herein stated, and provide the maximum indemnity allowed by law.

The terms of this indemnity and any other indemnities set forth in this Agreement shall survive the termination of this Agreement. In the event that Owner becomes aware of a claim affecting Licensee under the terms of this indemnification clause, Owner shall endeavor to put Licensee on timely notice of such claim.

19. Insurance

Licensee represents that it is self-insured. Owner agrees that a copy of the ordinance setting forth the self-insurance is sufficient evidence of self-insurance.

20. Easements

Licensee shall secure any right, license or permit from any governmental body, authority or other person or persons, which may be required for the construction or maintenance of Licensee's Attachment. Owner does not grant, convey nor guarantee any easements, rights-of-way or franchises for the construction and maintenance of the Attachment. To the extent permitted by law, Licensee hereby agrees to indemnify and save Owner harmless (on a pro rata basis with all other users of Owner's pole who failed to secure such right, license, permit or easement, based on their respective proportionate use of space on such pole and to the extent the other users are part of such claim) from any and all claims, including the expenses incurred by Owner to defend itself against such claims, resulting from or arising out of the failure of Licensee to secure such right, license, permit or easement for the construction or maintenance of the Attachment on Owner's pole, the loss of right-of-way or property owner consent, of the costs of relocating any of Owner's pole or other attachments on Owner's pole. In the event that Owner becomes aware of

a claim affecting Licensee under the terms of this provision, Owner shall endeavor to put Licensee on timely notice of such claim. However, such notice obligation of Owner does not extend to permits or franchises required by governmental entities. As applicable, all of the terms of the indemnity set forth in this Agreement are incorporated herein and shall apply with equal force to the indemnity set forth in this Section.

21. Letter of Credit, Performance Bond or Deposit

Owner shall require Licensee, to furnish an irrevocable letter of credit, performance bond, or deposit in an amount equal to three (3) year's Annual Pole Attachment Fees for all poles upon which the Attachment is installed, or \$10,000 dollars, whichever is greater, as a payment and/or performance guarantee for any sums which may become due to Owner for rentals, inspections, or work performed for the benefit of Licensee under this Agreement, including the removal of Attachment upon termination of this Agreement. Such security shall include an unqualified provision that the security will not be cancelled or changed except after one hundred eighty (180) days written notice to Owner. The amount of such security is subject to adjustment, at any time, by Owner for such amount as Owner may reasonably determine to be necessary. AEP forms for the letter of credit or performance bond are available and can be provided if requested from the "Licensee". Any deposit will be refunded, less any obligations due under this Agreement, upon termination of this Agreement.

22. Default or Non-Compliance

If Licensee fails to comply with any of the provisions of this Agreement, or defaults in the performance of any of its obligations under this Agreement, and fails within thirty (30) days, after written notice from Owner to correct such default or noncompliance, Owner may, at its option, take any one or more of the following actions: (i) suspend Licensee's access to climb or work on its Attachment on all of Owner's poles; (ii) terminate the specific proposal or proposals covering the pole to which such default or noncompliance is applicable; (iii) remove, relocate, or rearrange the Attachment to which such default or noncompliance relates, all at Licensee's expense; (iv) decline to permit additional Attachment hereunder until such default is cured; or (v) in the event of any failure to pay any of the charges, fees or amounts provided in this Agreement or any other substantial default, or of repeated defaults, terminate this Agreement. Notwithstanding the foregoing, Licensee shall have up to an additional thirty (30) days to correct such default or noncompliance if Licensee promptly commences its corrective efforts within the thirty day period described above and diligently continues such corrective actions thereafter. No liability shall be incurred by Owner because of any or all such actions. The remedies provided herein are cumulative and in addition to any other remedies available to Owner under this Agreement or otherwise. No such termination, however, shall reduce or eliminate the obligation of the Licensee to make payments of any amounts due to Owner for any services covered, shall not waive charges for any Attachment until said Attachment is removed from the pole to which it is attached and shall not affect Licensee's Indemnification of Owner or the Insurance requirements contained in this Agreement. Owner shall be entitled to recover any and all attorney fees, costs and expenses incurred in successfully pursuing any of the remedies set forth above to the extent permitted by law.

23. Alternative Dispute Resolution

Before seeking any action or complaint with a state or federal agency or court for a default under this Agreement or a claim that the enforcement of this Agreement is not consistent with state or federal law or is not a reasonable term or condition under state or federal law, the aggrieved party

shall first give notice to the other party of its intent to file an action. Upon receipt of such notice the parties shall engage in good faith executive level talks whereby each party is represented by an employee or agent that is vested with sufficient authority to make binding decisions.

24. Regulation

Both parties acknowledge that, prior to negotiation of this Agreement, the parties carefully reviewed all relevant provisions of state and federal statutes and regulations relating to the regulation of Owner's pole, and that the negotiations freely conducted herein were undertaken without duress and with full knowledge of any rights either party may have pursuant to such state or federal law. Both parties believe the fees charged herein to be in compliance with any applicable state or federal law. Each and every provision of this Agreement is considered an essential exchange of consideration hereto. Any deviation in the rate charged herein from the calculation of such rate pursuant to any applicable state or federal law imposed formula is a result of other negotiated concessions made herein by the Owner or Licensee. To the extent that either party may challenge any provision of this Agreement as a violation of state or federal law and is successful, then upon the sole option of the party to which such determination adversely affects, this Agreement shall terminate effective as of such determination. Upon such termination both parties shall enter into negotiations for a new agreement in compliance with such determination. It is the intent of both parties that any adjustments made pursuant to any such judicial or regulatory determination allow Owner to recover the maximum amount available in accordance with the applicable regulated rate.

Execution and performance of this Agreement are without prejudice to, and do not constitute a waiver of any positions taken or claims asserted respecting the validity, enforceability or effect of any or all such regulations or orders in any appeal, litigation or administrative proceeding pending at the date hereof or later begun, or any rights arising out of any judgment, opinion or order therein.

25. Term

Except as provided in the Default or Noncompliance Section, this Agreement shall continue for a period of one year from the date hereof, and shall thereafter automatically renew for successive one year periods unless one party gives the other party written notice of termination at least sixty (60) days in advance of the next renewal date. Should Licensee not place the Attachment on Owner's pole in any portion of the area covered by this Agreement within six (6) months of its effective date, Owner may, at its option, terminate this Agreement. Licensee shall completely remove its Attachments from Owner's pole within one hundred twenty (120) days of the termination date, unless an extension of the existing Agreement is negotiated or a new agreement covering such pole has been executed by the parties hereto. If Licensee fails to remove its Attachment, Owner may and is hereby given the clear and incontestable right to remove Licensee's Attachment, at Licensee's expense, from Owner's pole and without any liability to Owner. If 47 U.S.C. §224 is invalidated, repealed, reinterpreted, or amended in a manner that no longer sets a maximum attachment fee, then at either party's option this Agreement may be terminated upon one-hundred eighty (180) days' notice. During such termination notice period both parties shall in good faith negotiate terms and conditions of a new Wireless Pole Attachment License Agreement.

26. Prior Agreements

This Agreement terminates and supersedes any prior agreement, license or joint use affecting Owner's Poles and Licensee's attachments covered hereby as of the date hereof, but such termination shall not reduce or eliminate the obligation of Licensee to make payment of any amounts due to Owner under any prior agreement.

27. Transfers of Ownership

This Agreement shall be binding upon and inure to the benefit of the parties hereto, and Licensee shall not assign, transfer, sublet or sublicense any of the rights hereby granted without the prior written consent of Owner. If Licensee wishes to sell, or otherwise transfer, all or part of its Attachment covered by this Agreement to a third party, said third party shall submit an application to enter into an agreement with Owner for the installation and/or maintenance of the Attachment on Owner's poles, and reimburse Owner for any non-recurring expenses associated with Owner's review of the third party. Any outstanding liabilities of Licensee, including, without limitation, charges for inventories and inspections, charges and penalties for unauthorized attachments, or other outstanding costs or expenses shall be paid to Owner, in full, prior to the transfer of any rights and privileges of the Licensee, either with a new agreement or assignment of the existing agreement (at Owner's option), to said third party. Owner reserves the right, at its option, to consent to the transfer of the existing agreement to a new third party, or to require the execution of a new agreement in lieu of granting its consent to the assignment or transfer of any right, license or privilege under this Agreement.

Notwithstanding the above, Owner shall not unreasonably withhold its consent to Licensee to assign this agreement to an affiliate of Licensee provided such affiliate has, in Owner's sole discretion, the financial means and technical expertise to perform its duties herein, and reimburses Owner for any non-recurring expenses associated with Owner's review of such proposed assignment.

Owner shall be permitted to sell all or part of the poles covered by this Agreement to a third party. Upon such sale, Owner shall determine in its sole discretion whether to assign this Agreement. If Owner elects to assign this Agreement, then such assignee shall become Owner under the terms of this Agreement. If Owner does not elect to assign, then this Agreement shall terminate as of the date of such sale for those poles subject to such sale. Upon such termination, Owner shall be permitted in its sole discretion to conduct an inventory pursuant to Section 9 above and collect any amounts owed for unauthorized Attachments.

28. Governing Law

Except insofar as governed by federal law, this Agreement shall be construed in accordance with, and its performance shall be governed by, applicable laws in effect of the state where the poles are located.

29. State Tariffs

It is the intent of the parties hereto that all terms and conditions of this Agreement and any applicable state tariffs be construed as being consistent where possible; however, in the event of a conflict or inconsistency between their respective terms and conditions, the terms of the applicable state tariff shall control.

30. Third Party

This Agreement shall not create for, nor give to, any third party any claim or right of action against either party to this Agreement that would not arise in the absence of this Agreement.

31. Execution

This Agreement may be executed in two counterparts each of which so executed shall be deemed to be an original.

32. Agreement Modifications

This Agreement and its "Attachment Fee Schedule" constitute the entire agreement between the parties respecting pole attachments, and shall only be modified in a writing signed by both parties hereto.

33. Preservation of Remedies

No delay or omission in the exercise of any power or remedy herein provided or otherwise available to Owner shall impair or affect Owner's right thereafter to exercise the same.

34. Headings

Headings used in this Agreement are inserted only for the convenience of the parties and shall not affect the interpretation or construction of this Agreement.

35. Survival of Obligations

All payment, performance and indemnity obligations of Licensee under this Agreement shall survive the termination of this Agreement, until said obligations are satisfied.

36. Notices

Any and all notices required or permitted hereunder shall be in writing and mailed postpaid via United States First Class Mail or reliable, receipted overnight courier service, or submitted in an electronic format acceptable to the Owner as follows:

Owner:

AEP Texas
Attn: David B. Day, JUR
539 N. Carancahua Street
Corpus Christi, TX 78401
dbday@aep.com

Licensee:

County of Hidalgo County
Attn: Daniel Salinas
100 E. Cano
Edinburg, TX 78539
Daniel.salinas@co.hidalgo.tx.us

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the day and year first above written.

COUNTY OF HIDALGO, TEXAS

AEP TEXAS (TCC)

By: Richard F. Cortez

By: _____

Richard F. Cortez
(Print Name)

Marc A Feeney
Print Name

Title: Hidalgo County Judge

Title: Attachment Svcs. Contract Manager

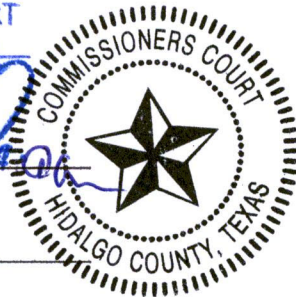
Date: 8/28/20

Date: _____

APPROVED BY
COMMISSIONERS' COURT
ON: 8-11-20 mn

ATTEST:

By: Arturo Guajardo, Jr.



Arturo Guajardo, Jr.
(Print Name)

Title: Hidalgo County Clerk

Date: 09/01/2020

ATTACHMENT FEES SCHEDULE

Purpose of Attachment:

Annual Fee Per Attachment:

Wireless Communication Equipment
(wifi / wireless equipment)

\$ 75.00

Approved Equipment:

Approved Frequencies:

Ruckus T610 – outdoor 802.11ac Wave 2
4x4:4 Wi-Fi Access Point

2.4GHz: 1 - 13
%GHz: 36-64, 100- 144, 149- 165
(Equipment Sheet attached)

LinkPower LPS3400ATMP-300-T1
Outdoor Layer 2+ Managed Gigabit PoE
Network Switch with Gigabit Fiber Uplink

Bandwidth: 12 Gbps (non-blocking)
(Technical Specs attached)

Mimosa – Super Sector
A5c Point-to-Multipoint Access Point

4.9-6.4 GHz
(Technical Specs attached)

Mimosa – Integrated radio/antenna
Mimosa integrated C5x radio and modular N5-X antenna

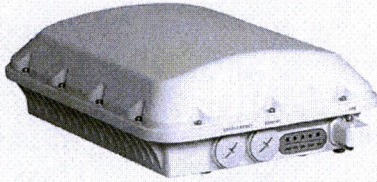
4.9-6.4 GHz
(Technical Specs attached)

T610

Outdoor 802.11ac Wave 2 4x4:4 Wi-Fi Access Point



DATA SHEET



BENEFITS

GREAT OUTDOOR WI-FI

Experience high performance outdoor Wave 2 Wi-Fi with IP-67 weather proofing and 2 gigabit Ethernet ports.

STUNNING WI-FI PERFORMANCE

Extends coverage with patented BeamFlex+™ adaptive antenna technology while mitigating interference by utilizing over 4,000 directional antenna patterns.

MULTIPLE MANAGEMENT OPTIONS

Manage the T610 from the cloud, or with on-premises physical/virtual appliances.

AUTOMATE OPTIMAL THROUGHPUT

ChannelFly™ dynamic channel technology uses machine learning to automatically find the least congested channels. You always get the highest throughput the band can support.

SERVE MORE DEVICES

Connect more devices simultaneously with four MU-MIMO spatial streams and concurrent dual-band 2.4/5GHz radios while enhancing non-Wave 2 device performance.

EXPANDED BACKHAUL

Pair two onboard 1GbE ports with link aggregation (LACP) to maximize throughput between the AP and wired switch.

EXPANDABLE CAPABILITIES

Augment AP capabilities through the onboard USB 2.0 port to support additional technologies.

MORE THAN WI-FI

Support services beyond Wi-Fi with [Ruckus IoT Suite](#), [Cloudpath](#) security and onboarding software, [SPoT](#) Wi-Fi locationing engine, and [SCI](#) network analytics.

In busy outdoor public venues, users and operators need fast, reliable connectivity. Whether it's smartphones running bandwidth-hungry voice and video applications, Internet of Things (IoT) sensors, or "Smart City" connected devices, crowded outdoor spaces demand high-performance Wi-Fi.

The Ruckus T610 delivers blazing-fast connectivity for medium-density outdoor deployments, with data rates up to 2.5Gbps—the highest available data rates for Wi-Fi clients. Patented Ruckus adaptive antenna technology improves signal quality for every connected device, everywhere. And the AP delivers all of this in an industrial-grade enclosure that can stand up to the rigors of the elements in practically any outdoor space.

The T610 is purpose-built for busy public venues such as outdoor campuses and hotspots, arenas, convention centers, and transportation hubs. It provides industrial-grade features such as secure image download and an IP67-compliant USB port, making it easy to deploy IoT applications for Smart Cities or large-scale video surveillance/monitoring systems. It's the perfect choice for medium-density deployments with standard Ethernet backhaul that require premium wireless performance.

The T610 802.11ac Wi-Fi AP incorporates patented technologies found only in the Ruckus Wi-Fi portfolio.

- Extended coverage with patented BeamFlex+ utilizing multi-directional antenna patterns.
- Improve throughput with ChannelFly, which dynamically finds less congested Wi-Fi channels to use.

Additionally, the T610 provides a full complement of next-generation 802.11ac features. 802.11ac Multi-User MIMO (MU-MIMO) support allows the AP to simultaneously transmit to multiple client devices, drastically improving airtime efficiency and overall throughput for all clients—even non-Wave 2 devices. SmartMesh™ wireless meshing technology accelerates time-to-deployment and eliminates the cost associated with running Ethernet cabling between multiple access points in the network.

Whether you're deploying ten or ten thousand APs, the T610 is also easy to manage through Ruckus' appliance, virtual and cloud management options.

ACCESS POINT ANTENNA PATTERN

Ruckus' BeamFlex+ adaptive antennas allow the T610 AP to dynamically choose among a host of antenna patterns (over 4,000 possible combinations) in real-time to establish the best possible connection with every device. This leads to:

- Better Wi-Fi coverage
- Reduced RF interference

Traditional omni-directional antennas, found in generic access points, oversaturate the environment by needlessly radiating RF signals in all directions. In contrast, the Ruckus BeamFlex+ adaptive antenna directs the radio signals per-device on a packet-by-packet basis to optimize Wi-Fi coverage and capacity in real-time to support high device density environments. BeamFlex+ operates without the need for device feedback and hence can benefit even devices using legacy standards.

Figure 1. Example of BeamFlex+ pattern

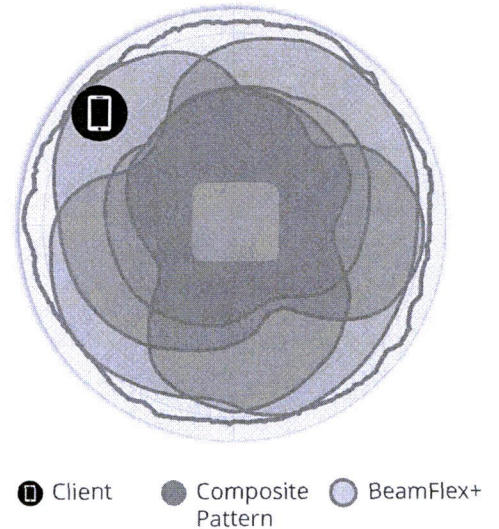


Figure 2. T610o 2.4GHz Azimuth Antenna Patterns

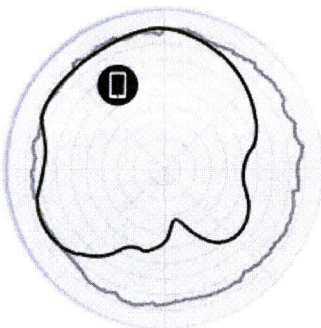


Figure 3. T610o 5GHz Azimuth Antenna Patterns

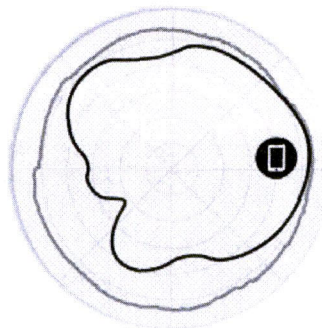


Figure 4. T610o 2.4GHz Elevation Antenna Patterns

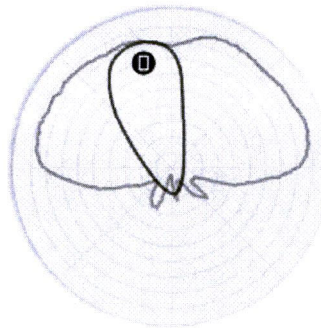
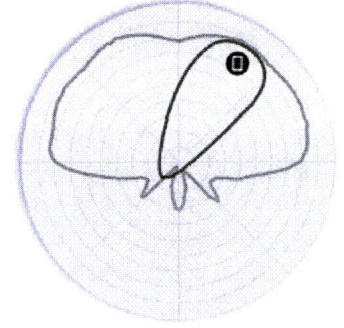


Figure 5. T610o 5GHz Elevation Antenna Patterns



Note: The outer trace represents the composite RF footprint of all possible BeamFlex+ antenna patterns, while the inner trace represents one BeamFlex+ antenna pattern within the composite outer trace.

WI-FI	
Wi-Fi Standards	<ul style="list-style-type: none"> IEEE 802.11a/b/g/n/ac Wave 2
Supported Rates	<ul style="list-style-type: none"> 802.11ac: 6.5 to 1,733Mbps (MCS0 to MCS9, NSS = 1 to 4 for VHT20/40/80) 802.11n: 6.5Mbps to 600Mbps (MCS0 to MCS 31) 802.11a/g: 54, 48, 36, 24, 18, 12, 9, 6Mbps 802.11b: 11, 5.5, 2 and 1 Mbps
Supported Channels	<ul style="list-style-type: none"> 2.4GHz: 1-13 5GHz: 36-64, 100-144, 149-165
MIMO	<ul style="list-style-type: none"> 4x4 SU-MIMO 4x4 MU-MIMO
Spatial Streams	<ul style="list-style-type: none"> 4 SU-MIMO 3 MU-MIMO
Radio Chains and Streams	<ul style="list-style-type: none"> 4x4:4
Channelization	<ul style="list-style-type: none"> 20, 40, 80MHz
Security	<ul style="list-style-type: none"> WPA-PSK, WPA-TKIP, WPA2 AES, 802.11i, Dynamic PSK WIPS/WIDS
Other Wi-Fi Features	<ul style="list-style-type: none"> WMM, Power Save, Tx Beamforming, LDPC, STBC, 802.11r/k/v Hotspot Hotspot 2.0 Captive Portal WISPr

RF	
Antenna Type	<ul style="list-style-type: none"> BeamFlex+ adaptive antennas with polarization diversity Adaptive antenna that provides up to 4,000+ unique antenna patterns
Antenna Gain (max)	<ul style="list-style-type: none"> Omni - Up to 3dBi Sector - Up to 8dBi
Peak Transmit Power (aggregate across MIMO chains)	<ul style="list-style-type: none"> 28dBm for both 2.4GHz & 5GHz
BeamFlex+ SINR Transmit Power Gain*	<ul style="list-style-type: none"> Up to 6 dB
BeamFlex+ SINR Receive Power Gain*	<ul style="list-style-type: none"> Up to 4 dB
Minimum Receive Sensitivity¹	<ul style="list-style-type: none"> -104dBm
Frequency Bands	<ul style="list-style-type: none"> ISM (2.4-2.484GHz) U-NII-1 (5.15-5.25GHz) U-NII-2A (5.25-5.35GHz) U-NII-2C (5.47-5.725GHz) U-NII-3 (5.725-5.85GHz)

2.4GHZ RECEIVE SENSITIVITY			
HT20		HT40	
MCS0	MCS7	MCS0	MCS7
-97	-79	-94	-78

5GHZ RECEIVE SENSITIVITY					
VHT20		VHT40		VHT80	
MCS0	MCS7	MCS0	MCS7	MCS0	MCS7
-96	-80	-94	-77	-91	-74

2.4GHZ TX POWER TARGET	
Rate	Pout (dBm)
MCS0 HT20	20
MCS7 HT20	17
MCS0 HT40	22
MCS7 HT40	19

5GHZ TX POWER TARGET	
Rate	Pout (dBm)
MCS0 VHT20	22
MCS7 VHT20	19
MCS0 VHT40, VHT80	22
MCS7 VHT40, VHT80	19

PERFORMANCE AND CAPACITY	
Peak PHY Rates	<ul style="list-style-type: none"> 2.4GHz: 600Mbps 5GHz: 1733Mbps
Client Capacity	<ul style="list-style-type: none"> Up to 512 clients per AP
SSID	<ul style="list-style-type: none"> Up to 31 per AP

RUCKUS RADIO MANAGEMENT	
Antenna Optimization	<ul style="list-style-type: none"> BeamFlex+ Polarization Diversity with Maximal Ratio Combining (PD-MRC)
Wi-Fi Channel Management	<ul style="list-style-type: none"> ChannelFly Background Scan Based
Client Density Management	<ul style="list-style-type: none"> Adaptive Band Balancing Client Load Balancing Airtime Fairness Airtime-based WLAN Prioritization
SmartCast Quality of Service	<ul style="list-style-type: none"> QoS-based scheduling Directed Multicast L2/L3/L4 ACLs
Mobility	<ul style="list-style-type: none"> SmartRoom
Diagnostic Tools	<ul style="list-style-type: none"> Spectrum Analysis SpeedFlex

* BeamFlex gains are statistical system level effects translated to enhanced SINR based on observations over time in real-world conditions with multiple APs and many clients.

¹ Rx sensitivity varies by band, channel width and MCS rate.

NETWORKING	
Controller Platform Support	<ul style="list-style-type: none"> SmartZone ZoneDirector Unleashed² Cloud Wi-Fi Standalone
Mesh	<ul style="list-style-type: none"> SmartMesh™ wireless meshing technology. Self-healing Mesh
IP	<ul style="list-style-type: none"> IPv4, IPv6
VLAN	<ul style="list-style-type: none"> 802.1Q (1 per BSSID or dynamic per use based on RADIUS) VLAN Pooling Port-based
802.1x	<ul style="list-style-type: none"> Authenticator and Supplicant
Tunnel	<ul style="list-style-type: none"> L2TP, GRE, Soft-GRE
Policy Management Tools	<ul style="list-style-type: none"> Application Recognition and Control Access Control Lists Device Fingerprinting Rate Limiting
IoT Capable	<ul style="list-style-type: none"> Yes

PHYSICAL INTERFACES	
Ethernet	<ul style="list-style-type: none"> 2 x 1GbE ports, RJ-45 LACP
USB	<ul style="list-style-type: none"> 1 USB 2.0 port, Type A connector

PHYSICAL CHARACTERISTICS	
Physical Size	<ul style="list-style-type: none"> 31.7(L) x 24.1(W) x 9.5(H) cm 12.8(L) x 9.5(W) x 3.7(H) in
Weight	<ul style="list-style-type: none"> 2.7kg (6lbs) without mounting hardware
Ingress Protection	<ul style="list-style-type: none"> IP-67
Mounting	<ul style="list-style-type: none"> Wall Pole Mount
Physical Security	<ul style="list-style-type: none"> Hidden latching mechanism Kensington lock T-bar Torx
Operating Temperature	<ul style="list-style-type: none"> -40°C (-40°F) to 65°C (149°F)
Operating Humidity	<ul style="list-style-type: none"> Up to 95%, non-condensing
Wind Survivability	<ul style="list-style-type: none"> Up to 266 km/h (165mph)

POWER ³		
Power Supply	Feature Limitation	Max Power Consumption
802.3af	<ul style="list-style-type: none"> 2.4GHz radio: 2x2, 18dBm per chain 5GHz radio: 4x4, 20dBm per chain 2nd Ethernet port & USB disabled 	10.4W
802.3at	<ul style="list-style-type: none"> 2.4GHz radio: 4x4, 22dBm per chain 5GHz radio: 4x4, 20dBm per chain 2nd Ethernet port & USB enabled 	25W

CERTIFICATIONS AND COMPLIANCE	
Wi-Fi Alliance⁴	<ul style="list-style-type: none"> Wi-Fi CERTIFIED™ a, b, g, n, ac Passpoint®, Vantage
Standards Compliance⁵	<ul style="list-style-type: none"> EN 60950-1 Safety EN 60601-1-2 Medical EN 61000-4-2/3/5 Immunity EN 50121-1 Railway EMC EN 50121-4 Railway Immunity IEC 61373 Railway Shock & Vibration UL 2043 Plenum EN 62311 Human Safety/RF Exposure WEEE & RoHS ISTA 2A Transportation

SOFTWARE AND SERVICES	
Location Based Services	<ul style="list-style-type: none"> SPoT
Network Analytics	<ul style="list-style-type: none"> SmartCell Insight (SCI)
Security and Policy	<ul style="list-style-type: none"> Cloudpath

ORDERING INFORMATION	
901-T610-XX00	<ul style="list-style-type: none"> T610 802.11ac Outdoor Wireless Access Point, 4x4:4 Stream, Omnidirectional Beamflex+ coverage, 2.4GHz and 5GHz concurrent dual band, Dual 10/100/1000 Ethernet ports, POE in, IP-67 Outdoor enclosure, -40°C to 65°C Operating Temperature. Includes standard 1-year warranty. Mounting kit sold as separate accessory (902-0125-0000). For box contents, see Shipping Container Contents.
901-T610-XX51	<ul style="list-style-type: none"> T610s 802.11ac Outdoor Wireless Access Point, 4x4:4 Stream, 120 degree sector Beamflex+ coverage, 2.4GHz and 5GHz concurrent dual band, Dual 10/100/1000 Ethernet ports, POE in, IP-67 Outdoor enclosure, -40°C to 65°C Operating Temperature. Includes standard 1-year warranty. Mounting kit sold as separate accessory (902-0125-0000). For box contents, see Shipping Container Contents.

See Ruckus price list for country-specific ordering information. Warranty: Sold with a limited 1-year warranty. For details see: <http://support.ruckuswireless.com/warranty>.

² Refer to Unleashed datasheets for SKU ordering information.

³ Max power varies by country setting, band, and MCS rate.

⁴ For complete list of WFA certifications, please see Wi-Fi Alliance website.

⁵ For current certification status, please see price list.

OPTIONAL ACCESSORIES	
902-0125-0000	• Secure articulating mounting bracket
902-0127-0000	• Extended cap to accommodate up to 6 cm long USB dongle
902-0183-0000	• Spare Weatherizing Cable Gland with 1 hole
902-0162-XXYY	• PoE injector (24W) (Sold in quantities of 1, 10 or 100)

PLEASE NOTE: When ordering Outdoor APs, you must specify the destination region by indicating -US, -WW, or -Z2 instead of XX. When ordering PoE injectors or power supplies, you must specify the destination region by indicating -US, -EU, -AU, -BR, -CN, -IN, -JP, -KR, -SA, -UK, or -UN instead of -XX.

For access points, -Z2 applies to the following countries: Algeria, Egypt, Israel, Morocco, Tunisia, and Vietnam.

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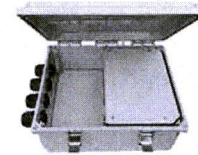
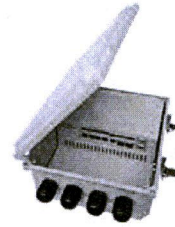
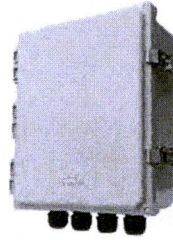
350 West Java Dr., Sunnyvale, CA 94089 USA

www.ruckusnetworks.com

19-01-E

LinkPower™ LPS3400ATMP-300-T1

Outdoor Layer 2+ Managed Gigabit PoE Network Switch with Gigabit Fiber Uplink



APPLICATIONS

- Smart City
- Video Security Surveillances
- Campus Networks
- Wireless Service Networks
- Border Security Surveillance
- Municipal Networks
- Hospitality Networks
- Hotel Resort Networks
- Hotspot Integrations
- VOIP Services
- Traffic Monitoring

The LinkPower™ LPS3400ATMP-300-T1 Layer 2+ 6-Port Managed Outdoor PoE (Power over Ethernet) IEEE802.3bt Switch offers 4-Port Gigabit PoE with 2 SFP Uplink Port Network Switch with dual power input redundancy with 120V~240AC and/or 48V DC. This is the industry first outdoor weatherproof industrial gigabit Ethernet switch that delivers data and high power DC, i.e., up to 95W Type 4 per PoE port, over one single network cable protected with an IP68 compliant weatherproof enclosure, and the total system power is 300W. The outdoor weatherproof rating of the systems is strictly based on how the top cover is closed. For the hinged cover without the four top cover screws, the outdoor weatherproof rating is IP66 and, otherwise, the outdoor rating is IP68 with the four top cover screws securely closed with the enclosure.

The LPS3400ATMP-300-T1 Outdoor Layer 2+ Managed Gigabit PoE Switch is designed for industrial and commercial applications, e.g., high performance video surveillance, high bandwidth wireless mesh, carrier wifi installations, and etc. The terminal equipment, i.e., powered devices, such as weather-proof high power IP camera, high performance wireless AP and industrial IP telephony. With the two port Gigabit fiber ports, it can transfer data up to a distance of 120Km from SFP fiber port to a remote control center and the systems is also offer with powerful anti-electromagnetic interference feature. Additionally, the LPS3400ATMP-300-T1 Layer 2+ Managed Gigabit PoE Series is designed for harsh outdoor environments with features such as a wide working temperature range from -30°C to +70°C and 3KV Ethernet port surge protection that can ensure the reliability of the uninterrupted PoE network operations. The LPS3400ATMP-300-T1 Outdoor Gigabit PoE Switch is a Managed network switch with Link Aggregation, VLAN, Trunking, SNMP, and QoS technology to meet the accelerating demand for powering the most demanding outdoor PoE devices. The LPS3400ATMP-300-T1 Gigabit PoE Switch provide LED displays internally that show device status for easy power management and troubleshooting. The PoE technology conveniently eliminates the need to install networked devices with multiple wires, such as Inscape Data's IP cameras and SB300/BR300, and B3000/BR3000 wireless products, thereby reducing equipment and installation costs. The LPS3400ATMP-T1 Gigabit PoE Switch offers the following key features:

- Dual Power Input Redundancy with 120V~240AC and/or 48V DC
- Compliant to IEEE 802.3, IEEE 802.3u, IEEE 802.3z, IEEE 802.3ab, IEEE 802.3x, IEEE 802.1D, IEEE 802.3af, IEEE 802.1Q, IEEE 802.1p, IEEE802.1x, IEEE 802.1W, SNMP, IGMP standards
- Four 10/100/1000M self-sensing RJ45 port, support IEEE802.3bt Type 3 & Type 4 PoE power supply function
- Four gigabit SFP fiber ports are capable of high bandwidth and long distance transmission
- All ports support auto-flip (Auto MDI/MDIX)
- Each PoE port can provide power 60W and up to 95W
- Supply 95W PoE++ DC power for powered devices compatible with IEEE802.3af/at
- Port security, allows setting different security level on each port with password, 802.1x, IP&MAC address Guard, RADIUS, & TACACS+
- Support IEEE802.3x full duplex flow control and duplex back pressure flow control
- Two SFP fiber optic ports, support 2.5Gbps uplink network speed
- 8K MAC address table, 12Gbps backplane bandwidth
- Its 4.5KV network port surge protection can adapt to harsh outdoor environment
- Working temperature from -30°C ~ +70°C at full load
- Compatible with Port-based VLAN, IEEE 802.1Q VLAN and GVRP protocols, & Dynamic VLAN MAC Address Authentication
- Support authentication features including TACACS+, IEEE 802.1x, HTTPS and SSH, and MAC address port locking
- Support SNMP V1/V2c/V3 for different levels network management
- Adopt RMON to effectively improve network surveillance and forecasting capabilities Auto accident report through E-mail and the output of electric relay

** LinkPower LPS Outdoor PoE Series Products are protected under several of Inscape Data's U.S. Patents.

Model Description	Outdoor 6-Port Layer 2+ Gigabit Managed PoE Switch
Model Name	LPS3400ATMP-300-T1
Port Interface	4 * 10/100/1000 RJ45 Ports, 2 * Gigabit LC Optical Ports
Optical Transmission Distance	20KM, 1310nm
Forwarding Mode	Save and forwarding, link-speed forwarding (Frame Size Range: 64~1536)
Network Media	10BASE-T: UTP Cat 3, 4, 5 (≤100 Meters) 100BASE-TX: UTP Cat 5/5e/6 (≤100 Meters)
Performance Specification	Bandwidth: 12Gbps (non-blocking) Network Latency (100 to 100M bps): maximum delay less than 50 microseconds Packet forwarding rate: 8.93Mbps@64bytes MAC address table: 8K MTBF: 539608 hours Support protection for over-current, over-voltage and reverse connection
Network Protocols and PoE Standards	IEEE 802.3i 10BASET IEEE 802.3u 100BASETX IEEE 802.3x Flow Control IEEE 802.3abt Type 3 60W & Type 4 95W
LED Indicator	Running Light: SYS, Interface Light: LINK, PoE
Power Supply	AC Input voltage: 120V ~ 240V AC DC Input voltage: 48V~57V Power Connector: 3-Pin AC & 4-Pin DC industrial terminal Block System Power : 300W Surge Protection: 6kv TP Port Surge Protection: 4.5Kv
Enclosure Dimension	LxWxH: (12 x 10 x 4 inch, 304.8 x 250.4 x 101.6 mm)
Working Environment	Working Temperature: -30~70°C Storage Temperature: -40~85°C Relative Humidity: 5%~95%, non-condensing Storage Humidity: 10%~95%, non-condensing Working Height: 3000M above sea level (10,000ft) Storage Height: 3000M above sea level (10,000ft)
Radiation	CE mark, commercial FCC Part 15 Class B
Certification	CE Mark ,Commercial CE/LVD FCC, RoHS、 C-TICK, UL
Warranty	3 Years

PACKAGE CONTENTS

- LinkPower LPS3400ATMP-300-T1 Gigabit PoE Switch
- User's Manual
- Quick Install Guide
- 3-Year Warranty Information
- APCK0001 AC Power Cable Kit
- PFCK0001-3 Power & Fiber Connector Kit
- ECK0001-4 Ethernet Connector Kit
- WMK0001 Wall Mount Kit with 4 Flanges (Standard)
- MMK0001-L Pole Mount Kit (Optional)



THE LEADING
OUTDOOR NETWORK
APPLIANCE COMPANY

Product Information Online: <http://www.inscapedata.com/lps3000-t1-mgt.htm>

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EMAIL sales@inscapedata.com

Total Turnkey Solutions for Outdoor PoE, Wired/Wireless, and IP Video Applications

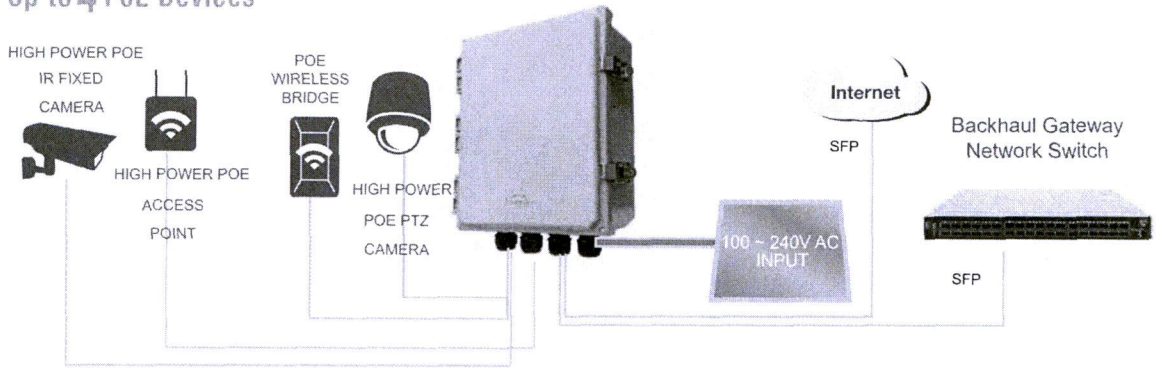
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Layer 2+ Switching	
Spanning Tree Protocol (STP)	Standard Spanning Tree 802.1d Rapid Spanning Tree (RSTP) 802.1w
G.8032 ERPS	<50ms ring protection for industrial high reliable application
Aggregation	Link Aggregation Control Protocol (LACP) IEEE 802.3ad; Up to 7 groups ; Up to 14 ports per group
VLAN	Support up to 4K VLANs simultaneously (out of 4096 VLAN IDs) ; Port-based VLAN; 802.1Q tag-based VLAN, GVRP, Dynamic VLAN MAC Address Authentication
IGMP v1/v2 snooping	IGMP limits bandwidth-intensive multicast traffic to only the requesters; supports 1024 multicast groups (source-specific multicasting is not supported)
Security	
Secure Shell (SSH) Protocol	SSH secures Telnet traffic in and out the switch, SSH v1 and v2 are supported
Secure Sockets Layer (SSL), HTTPS	SSL encrypts the http traffic, allowing advance secure access to the browser-based management GUI in the switch
Port Security	Locks MAC Addresses to ports, and limits the number of learned MAC addresses
DHCP Snooping	prevent unauthorized configuration and use of IP addresses, while providing support for IP Source Guard and ARP detection
IP Source Guard	Prevents datagram with spoofed addresses from being in the network
ARP Inspection	Prevent ARP spoofing attacks and ARP
Storm control	Prevents traffic on a LAN from being disrupted by a broadcast, multicast, or unicast storm on a port
ACLs	Support for up to 256 entries; Drop or rate limitation based on source and destination MAC, VLAN ID or IP address, protocol, port, differentiated services code point (DSCP) / IP precedence, TCP/ UDP source and destination ports, 802.1p priority, Ethernet type, Internet Control Message Protocol (ICMP) packets, IGMP packets, TCP flag
Quality of Service	
Hardware	Support 8 hardware queues
Scheduling	8 COS (Class of Service) queues per port support strict priority and weighted round-robin (WRR)
Classification	Port based; 802.1p (PCP) VLAN priority based;
Rate Limiting	Ingress policer; egress shaping and rate control; per VLAN,per port and flow based
Management (Web/ SSL, Telnet/ SSH, ping, Trivial File Transfer Protocol (TFTP), SNMP, Syslog)	
Web GUI interface	Built-in switch configuration utility for browser-based device configuration (HTTP/HTTPS). Supports configuration, system dashboard, maintenance, and monitoring
Dual Image	Dual image provides independent primary and secondary OS files for backup while upgrading
Firmware upgrade	Web browser upgrade (HTTP/ HTTPS) and TFTP; Upgrade through console port as well
Port mirroring	Traffic on a port can be mirrored to another port for analysis with a network analyzer or RMON probe. Up to N-1 (N is Switch's Ports) ports can be mirrored to single destination port. A single session is supported.
Other management	Single IP management; HTTP/HTTPS; SSH; RADIUS; TACACS+, DHCP Client; SNMP; cable diagnostics; ping; syslog; Telnet client (SSH secure support)

SYSTEM CONFIGURATION

**LinkPower™ LPS3400ATMP-300-T1
Managed Gigabit PoE Switch**

Connect Up to 4 PoE Devices

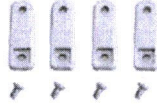


STANDARD ACCESSORIES

ECK0001-2
Ethernet Connector Kit



WMK0001
Wall Mounting Kit

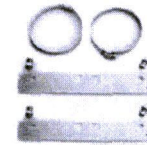


APCK0001
AC Power Cord Kit



OPTIONAL ACCESSORIES

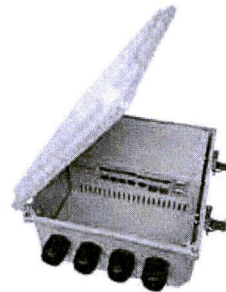
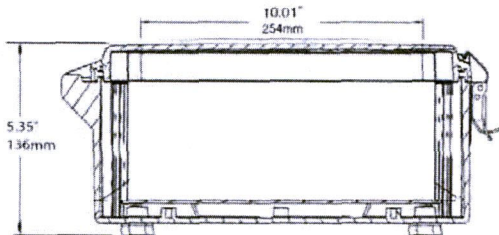
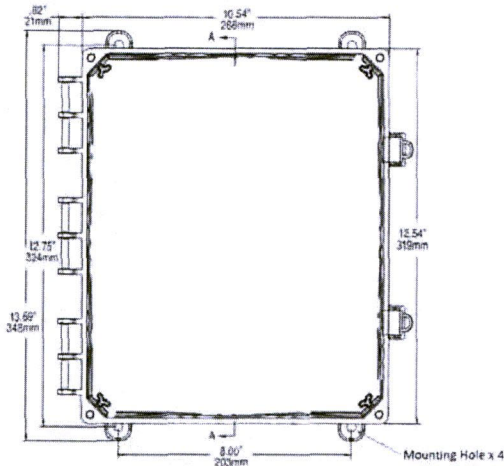
MMK0001-L Mast Mounting Kit
(For Pole Diameter from 2" to 4.5")



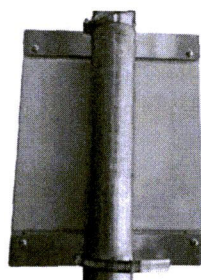
WPCK0001-3-4
DC Power Cord Kit



ENCLOSURE DRAWINGS & INTERFACES

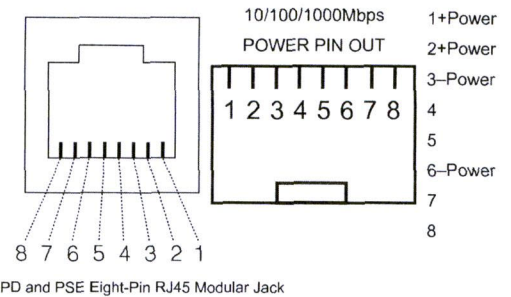


10"x5"x4" (WxLxH) Internal (Hotel) Space for Wiring Storage

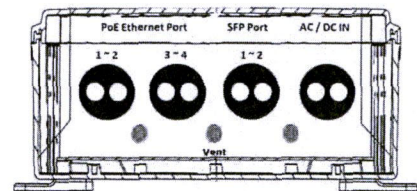


Pole Mount View

ELECTRICAL PIN OUT DIAGRAM



LPS3400ATMP-T1 Connector Interfaces



To Use Conduit Connectors, the Diameter of Hole Size is 1.0 Inch

1. Weatherproof PoE Connector (1~4)
2. Weatherproof SFP Cable Connector (1~2)
3. Weatherproof AC / DC Power Cable Connector
4. Vent Plug



THE LEADING
OUTDOOR NETWORK
APPLIANCE COMPANY

Total Turnkey Solutions for Outdoor PoE, Wired/Wireless, and IP Video Applications

Product Information Online: <http://www.inscapedata.com/lps3000-t1-mgt.htm>

Corporate Headquarters
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PHONE +1.408.392.9800 FAX +1.408.392.9812
EMAIL sales@inscapedata.com

Super Sector

A5c Point-to-Multipoint Access Point

4.9–6.4 GHz*



With the fastest client speeds and great access point capacity, along with local and network-wide spectrum reuse, the connectorized Mimosa A5c delivers the highest possible scale for any unlicensed fixed wireless network. The A5c is well suited for long range pole and tower multipoint applications, Access Point Collocation (GPS Sync) and Municipal and Rural Licensed Public Safety multipoint (4.9 GHz).

Increased Capacity at Each Site

With integrated, high-precision GPS Sync technology, new A5c sectors can easily be added at existing Mimosa A5 and B5 sites and reuse the same channel. This saves valuable, scarce unlicensed spectrum resources when new A5c devices are installed “back-to-back” on the same tower or pole.

Ultra-High Client Capacity

TDMA techniques provide significant improvements when scaling the number of clients. By dynamically allocating upstream timeslots upon client request, network scale, spectrum efficiency and access point utilization are optimized to the highest degree possible.

Network Scalability Perfected

Every deployed device is collaboratively synchronized

across the network. This allows easy channel reuse to save valuable spectrum network wide.

Connected to the Mimosa Cloud, deployment of the A5c is incredibly simple with network spectrum use and performance optimized across all of your deployed devices.

Fiber Speeds

With client speeds capable of 500+ Mbps and access point capacity up to 1.0 Gbps (IP), the A5c delivers the speeds consumers and business users demand at a fraction of the cost of delivering fiber-to-the-premises.

Add Subscribers with Ease

Install, aim and go! We've eliminated manual installation and pre-provisioning complexity, so you can focus on adding subscribers quickly.

Technical Specifications

Performance

- **Max Throughput:** Up to 1.0 Gbps IP (1.7 Gbps PHY)
- **Client Capacity:**
100 clients (WiFi Interop);
44 clients (SRS)
- **Wireless Protocols:** WiFi Interop, Spectrum Reuse Synchronization (SRS)

Radio

- **MIMO & Modulation:** 4x4:4 MIMO OFDM up to 256-QAM
- **Bandwidth**:** 20/40/80 MHz channels
- Tunable in 5 MHz increments for GPS Sync
- Tunable to standard WiFi channels for WiFi Interop
- **Frequency Range:**
- GPS Sync: 4900–6400 MHz*
- WiFi Interop: 5170–5835 MHz
- Restricted by country of operation ('new' US/FCC 5600–5650 support)
- **Max Output Power:** 30 dBm
- **Sensitivity (MCS 0):**
-87 dBm @ 80 MHz
-90 dBm @ 40 MHz
-93 dBm @ 20 MHz

Power

- **Max Power Consumption:** 25 W
- **System Power Method:** 802.3at compliant
- **PoE Power Supply:** Passive POE compliant, 48-56 V Power over Ethernet supply with IEC61000-4-5 surge protection

Physical

- **Dimensions:**
Height: 300 mm (11.81")
Width: 151 mm (12.40")
Depth: 85 mm (3.35")
- **Weight:** 1.75 kg (3.86 lbs)
- **Enclosure Characteristics:** Outdoor UV-stabilized engineered polymer with integrated mounting panel
- **Mounting:** Dual-pole strap mount and slip on mount for comparable antenna
- **Connector Type:** Female Type N (x4)

Environmental

- **Outdoor Ingress Protection Rating:** IP67
- **Operating Temperature:** -40°C to +55°C (-40°F to 131°F)
- **Operating Humidity:** 5 to 100% condensing
- **Operating Altitude:** 4,420 m (14,500') maximum
- **Shock & Vibration:** ETS 300-019-2-4 class 4M5

Features

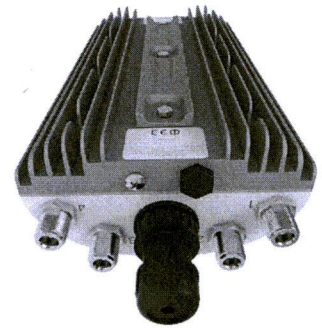
- **Gigabit Ethernet:** 10/100/1000-BASE-T
- **Synchronization:** GPS+GLONASS allows for network-wide sync and interference avoidance
- **Collocation:** 1PPS GPS Tx/Rx synchronization for same tower collocation and channel reuse
- **Network Processing:** Advanced AP control for capacity and subscriber management
- **Management Services:** Mimosa Cloud monitoring and management
- SNMPv2 & Syslog legacy monitoring
- HTTPS, HTML 5-based Web UI
- 2.4 GHz 802.11b/g/n radio for local management access
- **Smart Spectrum Management:** Active scan monitors/logs ongoing RF interference across channels (no service impact); Dynamic auto-optimization of channel and bandwidth use
- **Security:** WPA2 PSK & Enterprise 802.1x; Radius provisioning, COA, DM; 128-bit AES with hardware acceleration
- **VLANs:** Per subscriber VLAN; Q-in-Q, triple tagging; Management VLAN
- **QoS:** Supports 4 pre-configured QoS levels
- **PS Location:** GNSS1 (GPS + GLONASS)
- **Traffic Shaping:** Per CPE UL/DL commit and maximum rate shaping
- **Access Control List:** Permit, Deny and Remark Layer 2 and Layer 3 traffic flows

Regulatory + Compliance

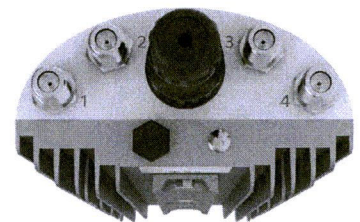
- **Approvals:** FCC Part 15.407 and Part 90Y, IC RSS210, CE, ETSI 301 893/302 502
- **RoHS Compliance:** Yes
- **Safety:** UL/EC/EN/ 60950-1 + CSA-22.2

*A5/A5c extended frequency, above 6.2 GHz, requires P/N 100-000xx-01

**4.9 GHz uses 20 MHz channel widths



A5c Backplate



A5c Connectors

Mimosa Networks, a division of Airspan, is the global technology leader in wireless broadband solutions, enabling service providers to connect dense urban and hard-to-reach rural homes at a fraction of the cost of fiber. Mimosa Networks was acquired in 2018 by Airspan, the leading vendor of 4G/5G LTE small cells and backhaul technologies.

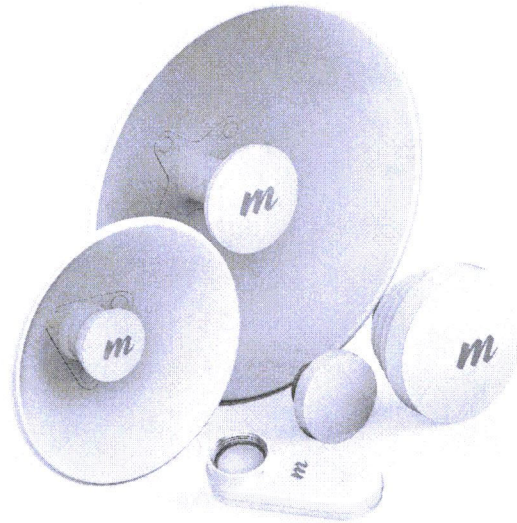
The Industry's Most Versatile, Modular Radio

Mimosa's integrated C5x radio and modular N5-X antennas provide the ultimate flexibility for PTP and PTMP extended frequency operation.

4.9–6.4 GHz

Key Features

- Four Twist-On, Flexible Antenna Options
- PTP or PTMP Modes
- Extended Frequency 4.9–6.4 GHz
- Best-in-Class Noise Immunity
- Ultra Rugged
- Low-Power Consumption
- Ultra Reliable



The Mimosa C5x is the industry's most versatile, modular, radio solution with five gain options (8, 12, 16, 20 and 25 dBi). The ultra-rugged solution provides extended frequency operation from 4.9–6.4 GHz, with best-in-class noise immunity. Delivering the ultimate in flexibility and value, the C5x is the go-to solution for 5 GHz deployments. The C5x can be used in PTP or PTMP mode with speeds of up to 700 Mbps.

Integrated Radio with Modular Antenna Options

The C5x radio's native 8 dBi gain can be increased to 12, 16, 20 or 25 dBi using Mimosa's modular, N5-X, twist-on antennas, offering the ease and simplicity of integrated radios, but with so much more flexibility!

Incredible RF Performance

Available with either Cassegrain or horn antenna options, the C5x reduces localized noise and provides immunity from interference with breakthrough front-to-back and front-to-side performance. Each antenna in the N5-X family is optimized to isolate noise with incredible sidelobe rejection.

Ultra Rugged

The C5x, with its die-cast aluminum metal enclosure, dual pole mounts, and industrial-grade twist-on antenna

options, is custom-engineered to reduce noise, withstand the outdoor elements and stay mounted in harsh wind and extreme weather.

Extended Frequency 4.9–6.4 GHz

To escape the noise, the C5x lets you take advantage of licensed frequencies from 4.9 GHz up to 6.4 GHz, where allowed by local regulations, including the public safety band in the US. The custom-designed N5-X modular antennas are specifically optimized for C5x extended frequency support.

Key Applications

- Broadband service providers
- Public safety and first responders
- Enterprise and campus building interconnecting
- Multipoint distribution for WiFi, video security and Smart Cities

Technical Specifications

Performance

- **Max Throughput:**
PTP/PTMP: 700 Mbps IP (866 PHY)
- **Wireless Protocols:** Mimosa SRS (GPS Sync); WiFi Interop
- **Modes:** PTP Backhaul; PTMP Client

Radio

- **MIMO and Modulation:** 2x2:2 MIMO OFDM, up to 256 QAM
- **Bandwidth:** 20/40/80 MHz channels, tunable to 5 MHz increments for Mimosa SRS and WiFi Interop mode
- **Frequency Range:** PTP/PTMP: 4900–6400 MHz (restricted by country of operation)
- **Max Output Power:** 27 dBm
- **Sensitivity (MCS0):**
-87 dBm @ 80 MHz
-90 dBm @ 40 MHz
-93 dBm @ 20 MHz

Power

- **Max Power Consumption:** 9.2 W average; 12.9 W max
- **System Power Method:** Passive POE (24-56 VDC)
- **PoE Power Supply:** Passive POE compliant, 24-56 V Power over Ethernet supply (not included)

Physical

- **Dimensions:**
Height: 175 mm (6.89")
Width: 70 mm (2.75")
Depth: 61 mm (2.40")
- **Weight:** 0.37 kg (0.82 lbs)
- **RF Connector Type:** Mimosa N5-X twist-on
- **Enclosure Characteristics:**
Outdoor, die-cast aluminum, UV stabilized paint
- **Mounting:** Dual attached pole mount straps
- **Grounding:** Ground lug
- **Wind Survivability:** 200 km/h (125 mph)

Environmental

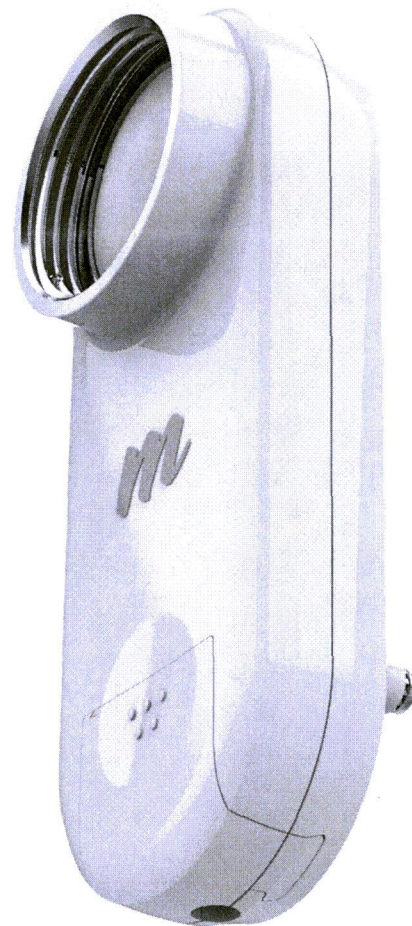
- **Outdoor Ingress Protection Rating:** IP55
- **Operating Temperature:** -40°C to +55°C (-40°F to 131°F)
- **Operating Humidity:** 5 to 100% condensing
- **Operating Altitude:** 4,420 m (14,500') max
- **Shock & Vibration:** ETS 300-019-2-4 class 4M5

Regulatory and Compliance

- **Approvals:** FCC Part 15.405 and Part 90Y CE/ETSI
- **EMI/Safety:**
FCC Part 15 Class B
EN 55022 Class B
IEC61000
UL/IEC 60950-2
IEC/EN 60905-1
- **WEEE/ROHS Compliance:** Yes

Features

- **Gigabit Ethernet:** 10/100/1000-Base-T
- **Management Services:** Mimosa cloud monitoring and management; SNMPv2 & Syslog monitoring; HTTPS; HTML5-based web UI
- **Smart Spectrum Management:** Active scan monitors/logs ongoing RF interference across channels with no service impact; Dynamic auto-optimization of channel and bandwidth use
- **Security:** WPA2 PSK and Enterprise 802.1x, Radius provisioning, COA, DM (from A5); 128-bit AES with hardware acceleration
- **VLANs:** Per subscriber, VLAN, Q-in-Q, triple tagging, management VLAN
- **QoS:** Supports 4 pre-configured QoS levels



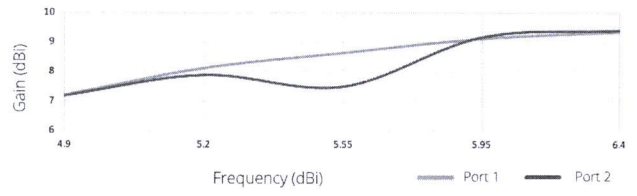
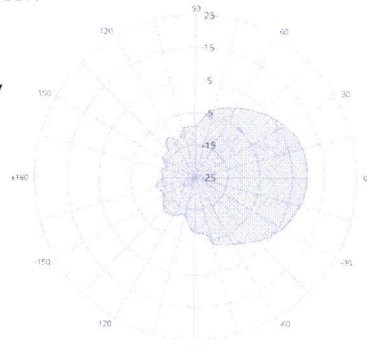
C5x with No Antenna

N5-X Modular Antenna Options for the C5x

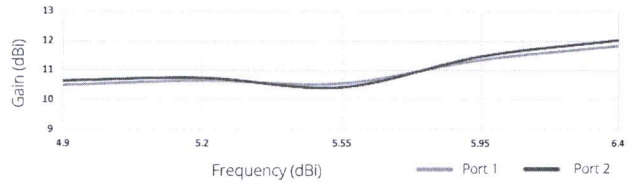
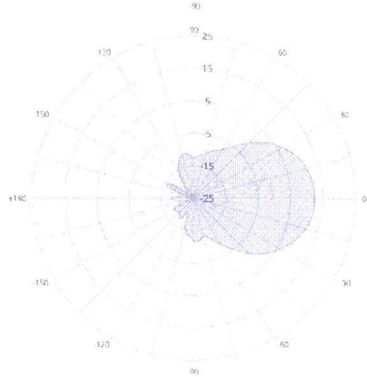
Product	C5x (no antenna)	N5-X12 (horn)	N5-X16 (horn)	N5-X20 (dish)	N5-X25 (dish)
Gain	8 dBi	12 dBi	16 dBi	20 dBi	25 dBi
Polarization	Dual-slant 45°	Dual-slant 45°	Dual-slant 45°	Dual-slant 45°	Dual-slant 45°
Beamwidth, Symmetric (3 dB)	58°	38°	22°	12°	8°
Front-to-Back Ratio (min)	21 dB	29 dB	50 dB	35 dB	40 dB
Front-to-Side Ratio (min)	21 dB	27 dB	43 dB	37 dB	> 45 dB
Weight	0.37 kg (0.82 lbs)	0.16 kg (0.35 lbs)	0.61 kg (1.35 lbs)	0.77 kg (1.70 lbs)	0.98 kg (2.15 lbs)
Dimensions	Width: 70 mm (2.76") Length: 175 mm (6.89") Depth: 61 mm (2.40")	Diameter: 76 mm (2.99") Depth: 67 mm (2.63")	Diameter: 160 mm (6.29") Depth: 116 mm (4.57")	Diameter: 270 mm (10.63") Depth: 83 mm (3.27")	Diameter: 429 mm (16.89") Depth: 116 mm (4.57")
Mount	Dual-pole clamps	Mimosa N5-X twist-on	Mimosa N5-X twist-on	Mimosa N5-X twist-on	Mimosa N5-X twist-on
Wind Survivability	200 km/h (125 mph)	200 km/h (125 mph)	200 km/h (125 mph)	200 km/h (125 mph)	200 km/h (125 mph)
Wind Loading	2.79 kg @ 160 km/h (6.14 lbs @ 100 mph)	3.27 kg @ 160 km/h (7.20 lbs @ 100 mph)	5.13 kg @ 160 km/h (11.30 lbs @ 100 mph)	14.55 @ 160 km/h (32.07 lbs @ 100 mph)	36.26 kg @ 160 km/h (79.95 lbs @ 100 mph)

Polar Plots and Gain Across Frequency

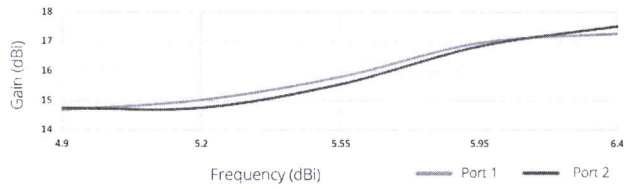
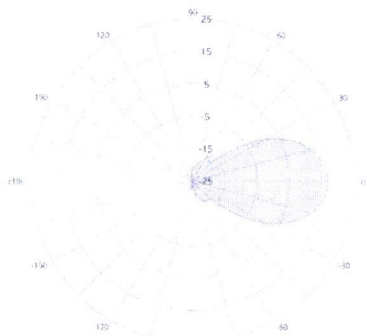
Native, Built-In (8 dBi)



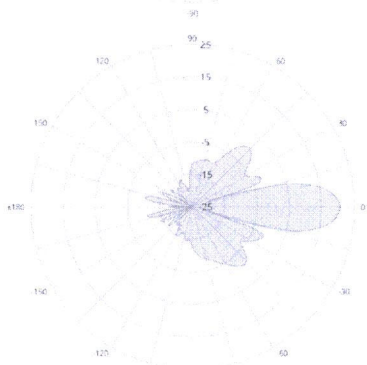
N5-X12 (12 dBi)



N5-X16 (16 dBi)



N5-X20 (20 dBi)



N5-X25 (25 dBi)

