US Embassy London

# BT TOWER: Antennae Installations

# Planning, Heritage and Design & Access Statement

October 2016

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Town Planning and Urban Design

**CONTENTS**



**APPENDICES**

## 1.0 INTRODUCTION

1.1 This Planning, Heritage and Design and Access Statement has been prepared in support of a Planning and Listed Building Consent application, for the erection of 1 dish and 3 telecommunications antennae to the secondary structural support frame on the gallery level of the BT Tower, Cleveland Street, London. The application is submitted on behalf of the US Embassy London.

1.2 This statement provides details of the history of the Tower, its changing role, function and appearance as well as a description and justification for the proposals. In so doing it performs a role, both as a Planning Statement and Heritage Statement. It also conforms to the requirements for a Design and Access Statement outlined within National Planning Practice Guidance[1]. This application accords with these requirements and LB Camden's list of validation requirements. It also includes an assessment of the proposals against relevant national and local planning policy.

1.3 The BT Tower, located at 60 Cleveland Street, Fitzrovia, London, once fulfilled a major role in communication technology. It hosted a variety of aerials and dishes to transmit microwave signals for telephone and television broadcasting. As technological advancement continued, the majority of these aerials became increasingly obsolete and were eventually removed in 2011. The Tower's history as a communication hub has been maintained with the addition of a limited number of small antennae to the secondary structural support frame and lattice at the top of the Tower in recent years.

1.4 An opportunity has arisen to install 4 antennae on the Tower to receive wireless video and audio transmissions. This proposal necessitates the attachment of a limited number of small antennae to the secondary structural support frame on the gallery level of the Tower.

1.5 This application is therefore submitted to gain the necessary listed building and planning approvals for attaching such equipment to the Tower, a Grade II listed building. The proposals are specifically for:

- 1x 0.8m Dish Antenna
- 3x 2.9m Dipole Antennas
- Internal Equipment Cabinet

[1] Department for Communities and Local Government, 2014. *Planning Policy Guidance*, Paragraph 016, Reference ID 14-016-20140306

1.6 This application comprises the following suite of information (in addition to this Planning, Heritage and Design and Access Statement):

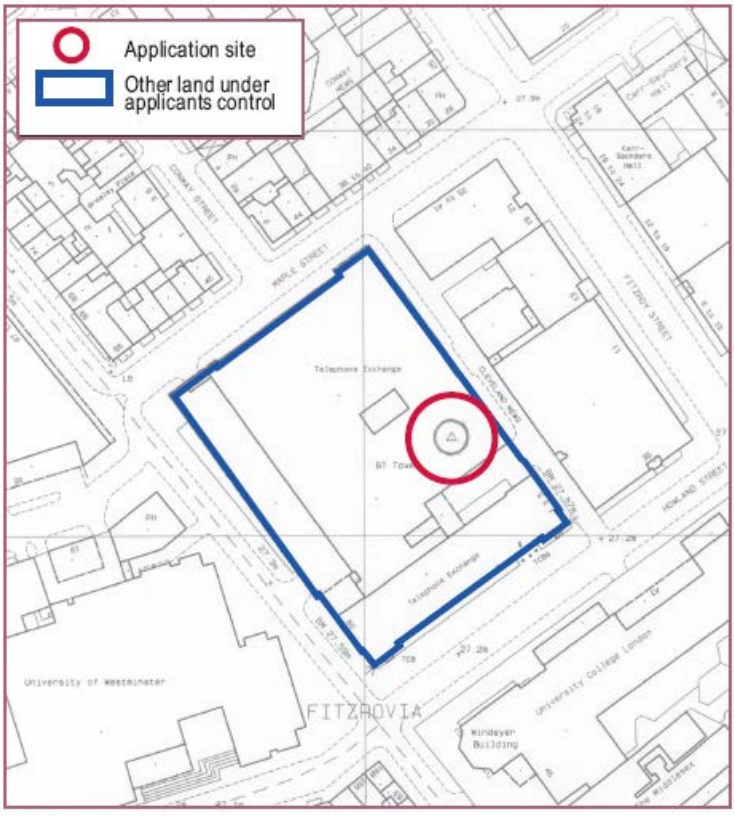
- Covering Letter
- Completed application forms
- Application drawings:
    - Site Location and Layout Plan (WL 4005107 Sheet 1/3)
    - Existing Layout and Proposed Layout (WL 4005107 Sheet 2/3)
    - Existing Elevation and Proposed Elevation view of Tower – West facing (WL 4005107 Sheet 3/3)
    - Enlarged Part Elevation of antennae mount details – West facing (WL 4005106 Sheet 2/3) - Issue A
    - Fixings to Rails (WL 4005106 Sheet 3/3) - Issue A
- Photographs showing the steelwork/antenna array to which the proposed antennas will be attached (contained within this statement)
- Specification of proposed antennae

## 2.0 BACKGROUND AND CONTEXT

### Site Location

2.1 The BT Tower is within the London Borough of Camden's administrative area. The Tower is located at 60 Cleveland Street, Fitzrovia. It is one of London's most prominent landmarks, standing at approximately 177 metres in height; it is a dominant feature of the London skyline. When it was built, it was the tallest building in London.

2.2 The Tower foyer entrance is located along Maple Street which runs to the North West of the Tower, to the east of the tower runs Cleveland Mews, and to the south east runs Howland Street. It is well located with regard to key routes around London, being in close proximity to Tottenham Court Road which links Euston Road to the north and Oxford Street to the south. The location of the Tower in relation to its surrounding built form is identified on the plan below (for illustrative purposes only):




Site Location Plan

2.3 Although not within a Conservation Area itself the BT Tower is in close proximity to both Charlotte Street and Bloomsbury Conservation Areas. It is a local landmark and the BT Tower is one of the most notable views from these Conservation Areas, as specifically identified in the Charlotte Street Appraisal and Management Plan (2008). The Tower therefore makes a positive contribution to the Conservation Area. There are also clear views of the BT Tower from Charlotte Place, Goodge Place and Tottenham Mews.

2.4 Fitzroy Square is also located just to the north of the BT Tower, within the Bloomsbury Conservation Area, this is the only Georgian Square in central London and thus views to and from the Tower and this Square are significant assets to the local environment.

**Listed Building Status**

2.5 The construction of the BT Tower was commissioned by the General Post Office and construction began in 1961. Its height ensures that it is a very notable landmark within London, and its prominence means it can be seen from most places in the city. In recognition of its status as a heritage asset and the desire to ensure its preservation, the Tower was Grade II Listed in 2003. This listing is defined by English Heritage as being 'nationally important and of special interest'. Its listing means that the BT Tower requires listed building consent for any substantive changes that are to be made to the building that may affect its special interest.

**Construction and Technology**

2.6 The BT Tower was constructed between 1961 and 1964; it was commissioned by the General Post Office to keep apace with telecommunications technology as demand for television broadcasting and telephone communication increased.

2.7 Construction of a tower was the preferred option to provide broadband radio links between London and the rest of the country, as the alternative was to create a ring of radio stations on the outskirts of London with broadband links extended to central London by cable.

2.8 The Tower itself needed to be of such height that a path, clear of any obstructions, could be provided to allow hundreds of simultaneous radio signals carrying telephone conversations, television programmes and computer data to be transmitted countrywide. The need for the aerials to transmit the microwaves in all directions required the Tower to be circular. These aerials have now largely been removed, due to their obsolete nature and deteriorating condition. The listed building consent for the removal of these aerials was granted in 2011 (2011/1048/L).

**Steel work/rails**

2.9 The steel work to which the proposed antennas will be attached is situated on the gallery level of the Tower and is 1.7 metres in height. Its original purpose was to house radio antenna and it has always been a visually significant part of the Tower structure and one which is easily visible from close and medium distances. Today, it houses important Tower equipment and small antennae.

*Photograph of the steelwork/antenna array to which the proposed antennas will be attached*

## 3.0 PLANNING POLICY AND HISTORY

3.1 There have been a number of applications for the installation of telecommunications equipment on the BT Tower in the recent past:

- 2016/0079/P & 2016/0120/L – Installation of 2 x 0.6m transmission dishes and internal equipment cabinet (Planning Application and Listed Building Consent) – Granted on 08/02/2016
- 2014/7820/P & 2014/7861/L – Installation of 2 x transmission dishes mounted on existing support poles (Planning Application and Listed Building Consent) – Granted on 04/02/2015
- 2014/1863/P & 2014/1892/L – Installation of 3 x transmission dishes (Planning Application and Listed Building Consent) – Granted on 09/06/2014
- 2013/4762/P & 2013/4812/L – Installation of 4 microwave dishes; 1 x 0.6m, 1 x 1.2m, 1 x 1.8m and 1 x 2.4m on the existing telecoms tower, along with an internal equipment cabinet and ancillary equipment (Planning Application and Listed Building Consent) – Granted on 17/09/2013
- 2013/4581/P & 2013/4665/L – Installation of 2 x 1.8m diameter dish aerials and 1 x 0.6m diameter dish aerial at 167m height (Planning Application and Listed Building Consent) – Granted on 03/09/2013
- 2013/4052/P & 2013/4576/L - Installation of 4 x 0.6m microwave dishes at 129m & installation of 5x omni-directional UHF antennas (1x 128m level and 4 x at 133m level) (Planning Application and Listed Building Consent) - Granted on 19/7/2013

3.2 The BT Tower is within the London Borough of Camden. The development plan which sets out the policy framework for the Tower comprises The London Plan and LB Camden's Local Development Framework (LDF), which includes their Core Strategy, Development Policies Document and emerging Local Plan. Policy is established at a national level by the National Planning Policy Framework.

**National Planning Policy Framework**

3.3 National planning policy is principally established within the National Planning Policy Framework (2012).

*Supporting High Quality Communications Infrastructure*

3.4 Chapter Five (*Supporting High Quality Communications Infrastructure)* is the relevant section for policy relating to telecommunications. Paragraph 42 states that *"Advanced, high quality communications infrastructure is essential for sustainable economic growth. The development of high speed broadband technology and other communications networks also plays a vital role in enhancing the provision of local community facilities."*

3.5 In addition, Para 45 states that *"Applications for telecommunications development (including for prior approval under part 24 of the General Permitted Development Order) should be supported by the necessary evidence to justify the proposed development."*

*Conserving and Enhancing the Historic Environment*

3.6 Chapter 12 provides the relevant information on protecting the historic environment, including conservation areas and listed buildings. Specifically, Paragraph 128 states that "*In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.*"

3.7 Paragraph 134 provides further clarity to how proposals should be considered, stating that *"Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal, including securing its optimum viable use"*.

3.8 The NPPF (Paragraph 45) advises that a Declaration of Conformity for the International Commission on Non-Ionizing Radiation Protection Public Exposure Guidelines (ICNIRP) should accompany applications for telecommunications (where there is an addition to an existing mast). BT advise that such a certificate is not required because the proposed antennae will be set up to receive only. They will not be transmitting.

3.9 This proposal conforms to the Tower's purpose as a telecommunications hub and utilising broadcasts from the Tower maximises its public benefit and economic function. The proposed antenna would not cause substantial harm to the significance of the Tower. As such, the proposals can be considered to conform to national policy.

**The London Plan (latest iteration March 2016)[2]**

3.10 The London Plan is the Mayor's Spatial Development Strategy for London. The proposals for the BT Tower are considered to meet the objectives set out in the London Plan.

3.11 The 'London's Living Spaces and Places' section of the London Plan is particularly relevant to Listed buildings. This emphasises the importance of making the most of London's built heritage and ensuring that any new developments respect this built heritage. More specifically policies 7.8 and 7.11 provide further guidance on protecting and managing the built heritage and the strategic views in the city.

3.12 A number of strategically important views have been identified in this section of the Plan, within which are various significant landmarks, which will act as a focus for the strategic view. These views will be protected and enhanced by 'London View Management Framework' Supplementary Planning Guidance to the London Plan. The BT Tower is a key landmark within a number of strategic views.

**London View Management Framework SPG (2012)**

3.13 The London View Management Framework SPG provides further detail on these strategic views within the City of London. This document seeks to designate, protect and manage the important strategic views across London and the landmarks within them.

[2] Greater London Authority, 2016. *Minor Alterations to The London Plan* were published on 14th March 2016

3.14 The BT Tower is a key landmark within a number of the strategic views including the Alexandra Palace panorama, Parliament Hill panorama, Kenwood panorama and Primrose Hill panorama. The proposed works to the BT Tower are not considered to compromise any of these views, as the Tower in terms of its height and position within the panoramas will not be affected as a result of the proposals. As a consequence, the works are not considered to have a long term or significant impact and thus are in line with the management guidelines outlined within the SPG.

**LB Camden Core Strategy (adopted November 2010)**

3.15 Promoting high quality places and supporting the Camden area as a successful component of Central London is a core principle in LB Camden's adopted Core Strategy. A significant element of this is the preservation and enhancement of the area's historic environment (Policy CS9). Policy CS14 emphasises the need to preserve the heritage of the area and this requires the preservation of Camden's heritage assets and also the protection of important views from inside and outside the Borough, in particular those of St Paul's Cathedral and the Palace of Westminster.

3.16 In seeking to protect these important city wide views, Camden require that any redevelopment of existing buildings should ensure that replacement buildings are of a height that does not harm the view. The application proposals will not alter the height or overall scale of the BT Tower and it will still retain its position as a landmark building within the strategic views across the city.

**LB Camden Development Policies Document (November 2010)**

3.17 The Development Policies Document supports the adopted Core Strategy and provides additional policies to help determine planning applications in the Borough. Policies DP24 'Securing High Quality Design' and DP25 'Conserving Camden's Heritage' directly support Policy CS14 of the Core Strategy mentioned above. DP24 requires that all development considers both the "*character setting, context and the form and scale of neighbouring buildings"* and particularly where alterations are proposed, the '*character and proportions of the existing building'*. Policy DP25 sets out the Borough's development management policy relating to conserving the areas heritage. In relation to listed buildings this policy sets out that to preserve the Borough's heritage the Council will:

- *prevent the total or substantial demolition of a listed building unless exceptional circumstances are shown that outweigh the case for retention;*

- *only grant consent for a change of use or alterations and extensions to a listed building where it considers this would not cause harm to the special interest of the building; and*
- *not permit development that it considers would cause harm to the setting of a listed building.*

3.18 The application complies with this policy as it is considered that a significant element of the special interest of the Tower is attributed to its ever-changing character and its ability to evolve with technological advances. Given the extremely limited nature and scale of the proposals it can be considered that the erection of antennae in their proposed location would cause no detrimental impact to the view, or harm the setting of the building (the listed asset).

**Camden Local Plan (2016)**

3.19 Camden recently submitted the Submission Draft Camden Local Plan 2016 and supporting documents to the Secretary of State for independent examination. It is clear from this document that the Council remains committed to the protection of its heritage assets and important views as set out in the London Plan (Policies D1 and D2).

3.20 The installation of the proposed antennae, help to continue the use of the Tower for its original purpose and its extremely limited visual impact ensures that the proposals preserve and enhance the character of the heritage asset, and as such comply with the Camden Local Plan.

3.21 It is considered that this development complies with the policies outlined above. The resulting impact of the development on the built form of the Tower will be insignificant, and one that will have minimal visual impact on the surrounding locality, or amenity. This will be further considered in the next section.

**Evaluation**

***Site Factors***

3.22 The BT Tower is a Grade II listed building and therefore special regard must be awarded to the effect that the proposals will have on the building and its setting. In accordance with paragraph: 012 Reference ID: 18a-012-20140306 of the Planning Practice Guidance, the impact on the significance of the listed building has been assessed within this Planning, Heritage and Design and Access Statement.

1. historic and special architectural importance of building
2. physical features that justify its designation
3. building's setting

3.23 Being situated just outside the Conservation Areas of Charlotte Street and Bloomsbury, the proposals should not have a negative effect on the historic character and architectural quality of these areas.

## 4.0 PROPOSALS AND JUSTIFICATION FOR THE WORKS

4.1 This section will outline the details of the proposals, the design specifications and justification for the development.

**Antennae**

4.2 A total of 4 telecommunications antennae will be installed. These are outlined below:

- 1x 0.8m Dish Antenna
- 3x 2.9m Dipole Antennas

4.3 The dish antennae will be installed only on the western face of the steelwork/rails. The diameter of the dish is 0.8 metres. Three dipole antenna will be installed on the western face of the steelwork/rails. The height of each dipole antenna is 2.9 metres. An equipment cabinet would also be installed internally. Appendix two provides technical details with regard to the proposed equipment.

4.4 A significant number of aerials are present at a height of approximately 167m, just above the electronic 'infoband' signage. These have been erected at various stages in the recent past. This is confirmed by the number of planning applications that have been submitted by external communications operators in recent years.

4.5 The purpose of the antennas is to receive wireless video and audio transmissions.

**Construction and Phasing**

4.6 Two steel plates will be fixed to the steelwork/rails to attach the dish antenna, which itself will be approximately 1.7 metres from the gallery floor (167m). The steel plates will be attached to the bracket via vertical mounted steelwork.

4.7 Steel clamps will be used to fix the dipole antenna to the support frame structure at approximately 1.7 metres from the gallery floor (167m).

4.8 An existing photograph of the structural support frame is displayed below:

4.9 The antennae and the associated fixing bracket will be attached to the steelwork/rails. As such, there is no requirement for any scaffolding to be erected to aid their installation. The equipment and apparatus will be transported up the Tower via the internal lift (after arriving on-site via the Cleveland Mews entrance).

**Justification**

4.10 Erection of these antennae ensures that the BT Tower keeps pace with future demand within the telecommunications sector and is an acknowledgement of its continual role within the industry.

## 5.0 ASSESSMENT OF SIGNIFICANCE AND IMPACT

5.1 The BT Tower is a Grade II listed building, situated within a central London location, and it one of the most prominent landmarks on the city's skyline. Therefore, any alterations, particularly to the external appearance of the building may have an effect on both the listed building itself and on its setting.

5.2 The NPPF states at paragraph 128 that applicants must 'describe the significance of any heritage assets affected, including any contribution made by their setting'. In addition, LB Camden's validation requirements indicate that any application should include an assessment of the asset's significance and the impact of the proposal.

5.3 Paragraph 128 also states that *"in determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting"*. It is further stated that *"the level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance."*

5.4 In light of these requirements, this section provides an assessment of the heritage asset and the potential impact of the proposals.

5.5 The Tower's significance, is based upon three main considerations and any development will need to be considered in the context of these:

- historical significance;
- cultural significance; and
- architectural/aesthetic significance.

5.6 The BT Tower is one of the most iconic buildings of the 20th century and is an important historical landmark within the London skyline. At the time of its completion, it was the tallest building not only in London, but also the United Kingdom. As a result of its longevity and bold presence, it makes an important contribution to the built fabric of the city. It is also important to remember that the original purpose of the building was for telecommunication purposes. As technology has evolved, so have the requirements for telecommunications. Aerials have been added and removed to reflect changing technologies since it was built. It has managed to retain its role as a telecommunications hub through adaptation to changing circumstances.

5.7 The proposed antennae are simply the latest technological addition to the Tower, meeting a current need for video and audio broadcast transmissions and in so doing continuing its historical significance.

5.8 Its cultural significance is underpinned by its role in the surrounding locality. It remains the dominant landmark in this part of London, and thus retains a strong visual relationship with its surroundings and is a part of the city's identity. It is a symbol also of BT, representing their status not just as a leader in the telecommunications industry but one of the country's most prominent and well respected companies. Not only will these antennae have no impact on the Tower's cultural significance, given the extremely limited visual impact; and the contribute to the forward thinking image of the Tower as a telecommunications hub.

5.9 The architectural significance of the BT Tower relates to the buildings height and cylindrical form. The structural frame has a more minor role in the Tower's form and appearance, and is not an intrinsic part of the Tower's architecture. The proposals will not increase the size or prominence of the support frame and will be barely visible from street level. As such, the proposals will not unduly affect the architectural significance of the Tower.

**Assessment of Impact**

5.10 The historical character of the Tower is embedded in its ever changing appearance that reflects the technological advances of certain eras. As a result, the historical and architectural importance of the building derives principally from its role in telecommunications, which is underlined by the building's tall and elegant form. The Tower remains a telecommunications hub, and these proposals reinforce this role.

5.11 Attaching the antenna to the steel support frame (which is of little architectural significance) reduces any visual impact upon the integrity and historic form of the Tower.

5.12 As a result of the extremely limited impact of the proposals, there will be no adverse impact on the building's setting and the Tower will remain in its current form undiminished. The proposals therefore are not considered to require any mitigation measures.

## 6.0 CONCLUSIONS

6.1 The BT Tower is an important and iconic building that has held a prominent position on the London skyline since its construction in 1965. Since its completion, it has been an icon in reflecting technological telecommunications evolution. As a result, it has embraced many alterations, and this has continued unabated in recent years.

6.2 The Grade II listing rightly demonstrates the Tower as an important historical asset, but also one that celebrates its role in the telecommunications sector. The US Embassy London is seeking to continue this telecommunication function by installing a series of small antennae attached to the secondary support frame at the gallery floor level of the Tower. The proposals have been demonstrated to have minimal impact, either upon the support frame to which the antenna will be fixed to, and also to the rest of the Tower.

**APPENDICES**

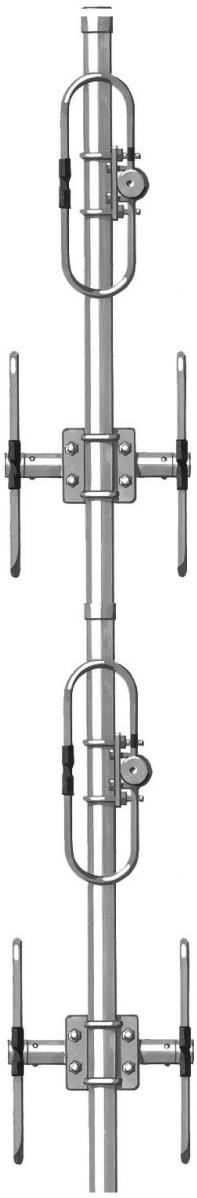
APPENDIX 1 - Antennae Specification

**Appendix 1 - Antenna Specification**

## SD3352-HF1PASNF Exposed dipole, 6/8.5 dBd, HD, field adjustable, 406-512 MHz

- 6.0 dBd gain in Omni-directional configuration; 8.5 dBd gain in bi-directional configuration
- Broadband covering entire 406-512 MHz frequency range
- 300 Watts power handling

The SD3352-H is a highly versatile broadband antenna featuring omni-directional or bi-directional pattern coverage. The pattern may be easily changed in the field. Because the SD3352 covers the entire 406-512 MHz, it is ideally suited for use in multicoupled systems. Heavier duty and/or higher power rated models are available on special order.



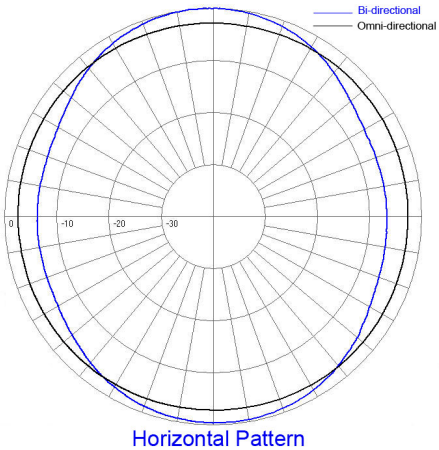



| Region | United States | Europe, Middle East and Africa | Caribbean and Latin America | Canada and rest of the world |
|---|---|---|---|---|
| Telephone | USA: 1 800 263 3275 | International: +44 (0) 1487 84 28 19 | International: +1 905 726 7676 | Canada: 1 800 263 3275<br>International: +1 905 727 0165 |
| E-mail | salesusa@sinctech.com | salesuk@sinctech.com | salesla@sinctech.com | salescan@sinctech.com |

| Electrical Specifications | | | |
|---|---|---|---|
| Frequency Range | MHz | 406 to 512 | |
| Connector | | N-Female | |
| Gain (nominal) | dBi (dBd) | 10.6 (8.5) | *1 |
| Input VSWR (max) | | 1.5:1 | |
| Polarization | | vertical | |
| Impedance | Ω | 50 | |
| Pattern | | Omni or Bi-directional, Adjustable | |
| Vertical beamwidth (typ) | degrees | 15 | |
| Average Power Input (max) | W | 300 | |
| Lightning protection | | DC ground | |
| Electrical tilt (available) | | 0 or 6 degrees | |

**Notes**
*1 : 6 for omni
*2 : Qty 2

| Mechanical Specifications | | | |
|---|---|---|---|
| Depth | mm (in) | 324 (12.75) | |
| Length/ Height | mm (in) | 2896 (114) | |
| Width | mm (in) | 324 (12.75) | |
| Base pipe diameter | mm (in) | 60 (2.38) | |
| Base pipe mounting length | mm (in) | 610 (24) | |
| Radiating element material | | aluminum | |
| Base pipe material | | aluminum | |
| Weight | kg (lbs) | 11.8 (26) | |
| Weight iced | kg (lbs) | 29.06 (64) | |
| Mounting Hardware (Standard) | | Clamp130 | *2 |
| Actual Shipping weight | kg (lbs) | 18.61 (41) | |
| Shipping dimensions | mm (in) | 3048x457x305 (120x18x12) | |
| Mounting configurations | | Bottom mount | |



Horizontal Pattern

| Environmental Specifications | | |
|---|---|---|
| Temperature range | °C (°F) | -40 to +60 (-40 to +140) |
| Wind Loading Area (Flat Plate Equivalent) | m² (ft²) | 0.2 (2.12) |
| Wind Loading Area (1/2" ice) | m² (ft²) | 0.34 (3.62) |
| Rated wind velocity (no ice) | km/h (mph) | 290 (180) |
| Rated wind velocity (1/2" radial ice) | km/h (mph) | 242 (150) |
| Lateral thrust (100 mph No Ice) | N (lbs) | 342.5 (77) |
| Bending moment (100 mph No Ice) | Nm (ft-lbs) | 344.3 (255) |
| Tip deflection (100 mph No Ice) | degrees | 0.5 |

Panasonic
ideas for life

JAPANESE

# GPS L1 Antenna VIC100


TOP

Corporate Information

Product Information

Features

Specifications

Link

Panasonic Electric Works Corporation of America

Panasonic Electric Works Europe AG

Contact


## Product specification

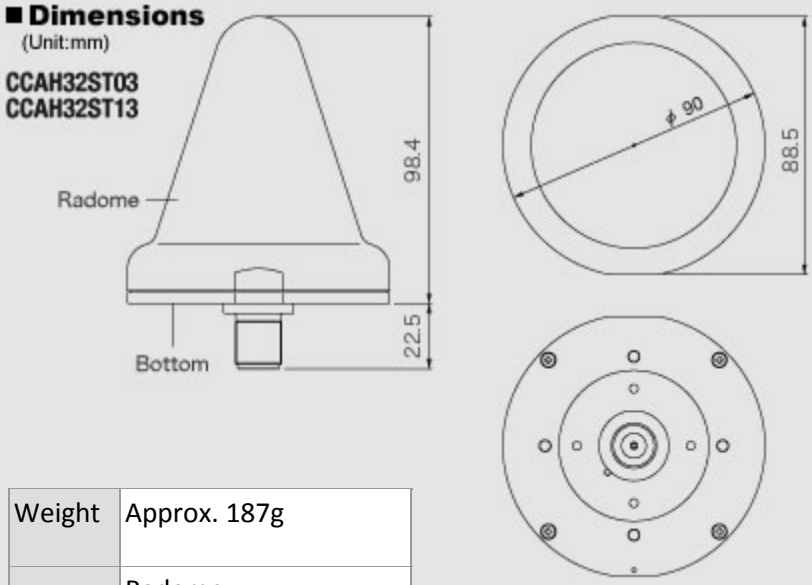
| | | |
|---|---|---|
| Electrical | Frequency Range | 1575.42MHz ±1.023MHz |
| | Polarization | Right-hand circular |
| | Total Gain | 38dBi typical |
| | Attenuation | 60dB typical at1575.42MHz ±50MHz |
| | Noise Figure | 1.8dB typical (< 2.2dB) |
| | VSWR | 1.5 typical (< 2.5) |
| Operating Voltage | | DC5V ±0.5V |
| Operating Current | | 20mA typical (< 27mA) |
| Environ-mental | Operating Temperature | -40~85°C |
| | Storage Temperature | -45~90°C |
| | Immunity to lightning surge | IEC61000-4-5 Level4 |

*This product is compliant with the European RoHS Directive.

## ■ Dimensions

(Unit:mm)

**CCAH32ST03**
**CCAH32ST13**




| | |
|---|---|
| Weight | Approx. 187g |
| Material | Radome :Polycarbonate<br>Bottom :Die-cast aluminum |

**TNC Connector**


**N Connector**

**Mounting Base (B)**

## ■ Product model

[Standard Antenna]

| Connector | Part No. | Mounting Base |
|---|---|---|
| TNC Connector | CCAH32ST01 | (A) |
| | CCAH32ST02 | (B) |
| | CCAH32ST05 | - |
| N Connector | CCAH32ST04 | (B) |

| | | |
|---|---|---|
| | CCAH32ST03 | - |

[Antenna with enhanced immunity to lightning surge]

| Connector | Part No. | Mounting Base |
|---|---|---|
| TNC Connector | CCAH32ST16 | (A) |
| | CCAH32ST12 | (B) |
| | CCAH32ST15 | - |
| N Connector | CCAH32ST14 | (B) |
| | CCAH32ST13 | - |

⚠ Notice for use

Please note the following items in order to secure a good signal reception.

- For antenna placement, select an area where the GPS antenna will have an unobstructed view of the sky.
- Install the GPS antenna vertically to the earth.
- In case of locating the GPS antenna near high-voltage electrical power lines or transmitting antennas (such as Cellular), make sure the system performance before starting the actual installation.


# PTP 650 SERIES

## RELIABLE, HIGH-CAPACITY POINT-TO-POINT WIRELESS BROADBAND DESIGNED FOR YOUR MULTI-SERVICE NETWORK

Service providers, government public safety agencies, and critical infrastructure operators such as utilities and energy companies have experienced massive growth in data, voice, and video traffic over the past few years. This growth has imposed large bandwidth demands for reliable and secure broadband connectivity and backhaul worldwide.

Cambium Networks disrupts the performance-reliability continuum with the Cambium Point-to-Point (PTP) 650 Series solution. With up to 450 Mbps aggregate throughput, PTP 650 systems let you reliably and securely handle today's needs with scalability to meet future requirements.

### FLEXIBLE, SPECTRALLY-EFFICIENT, SELF-OPTIMIZING SUB-6GHZ SOLUTION

Based on our widely-deployed, field-proven non-line-of-sight (NLOS) technology, PTP 650 wireless Ethernet bridges offer an ideal array of features that give you more capacity, greater operational flexibility, and the highest spectral efficiency in the industry. PTP 650 systems provide 4.9 to 6.05 GHz, multi-band flexibility in a single radio and operate in channel sizes from 5 to 45 MHz.

With Dynamic Spectrum Optimization (DSO), PTP 650 systems are constantly optimizing the channel of operation to maximize link reliability and performance. The systems can provide up to 99.999% availability in virtually any environment, including non-line-of-sight, long-distance line-of-sight, high interference, over water and desert, and through extreme weather conditions. As a result, you can deliver more throughput with less spectrum and less investment in even the most challenging environments.

### DESIGNED WITH YOU IN MIND

Whether your organization is an enterprise, government agency, or service provider, PTP 650 systems are ideal solutions for a wide array of applications such as T1/E1 and fiber replacements or extensions; video surveillance backhaul; LTE, macro-cell, and small-cell backhaul; last-mile access; disaster recovery; network redundancy; and building-to-building campus connectivity.

### FIELD TESTED AND INDUSTRY CERTIFIED

PTP 650 radios meet industry standards with proven compliance to assure you of interoperability, security, and ruggedization.

- FIPS 197 128/256-bit AES encryption
- IEEE 1588v2 and Synchronous Ethernet (SyncE)
- IPv6/IPv4 dual-stack management support
- Ingress Protection rated (IP66/67) protective aluminum radio enclosures
- MEF9 certification

## RADIO TECHNOLOGY

| | |
|---|---|
| RF bands[1] | Wide-band operation 4.9 to 6.05 GHz (Allowable frequencies and bands are dictated by individual country regulations. The most common bands are listed here.)<br>4.940 – 4.990 GHz (Public Safety)<br>5.15 – 5.25 GHz<br>5.25 – 5.35 GHz<br>5.470 – 5.725 GHz[2]<br>5.725 – 5.850 GHz<br>5.825 – 6.050 GHz |
| Channel sizes[3] | 5, 10, 15, 20, 30, 40, and 45 MHz channels<br>Channel sizes depend on individual country regulations |
| Spectral efficiency | 10 bps/Hz maximum |
| Channel selection | By Dynamic Spectrum Optimization or manual intervention;<br>automatic selection on start-up and continual self-optimization to avoid interference |
| Maximum transmit power[4] | Up to 27 dBm at BPSK; up to 23 dBm at 256 QAM |
| System gain[4] | Integrated: Up to 164 dB with 20 MHz channel and integrated 23 dBi antenna; varies with modulation mode, channel size and spectrum<br>Connectorized: Varies with modulation mode and antenna type |
| Receiver sensitivity | -98 dBm with 5 MHz channel |
| Modulation / error correction | Fast Preemptive Adaptive Modulation featuring 13 modulation / FEC coding levels ranging from BPSK to 256 QAM dual payload MIMO |
| Duplex scheme | Synchronized Time Division Duplex (TDD) and Half Duplex Frequency Division Duplex (HD-FDD); dynamic or fixed transmit/receive ratio; each TDD-synchronized link requires a Cambium TDD-SYNC synchronization unit[5] to provide an accurate timing reference signal |
| Antenna | Integrated: Flat panel – 23 dBi<br>Connectorized: Can operate with a selection of separately-purchased single- and dual-polarity antennas through 2 x N-type female connectors (local regulations should be checked prior to purchase) |
| Range | Up to 124 miles (200 km) |
| Security | FIPS-197 compliant 128/256-bit AES Encryption (optional)<br>HTTPS and SNMPv3<br>Identity-based user accounts<br>Configurable password rules<br>User authentication and RADIUS support<br>Event logging and management; optional logging via syslog<br>Disaster recovery and vulnerability management |

## ETHERNET BRIDGING

| | |
|---|---|
| Protocol | IEEE 802.3 |
| User data throughput | Dynamically variable up to 450 Mbps<br>Maximum conditions – 2x2, 45 MHz channel[1], 256 QAM<br>Flexible capacity licensing model:<br>Lite Capacity: Up to 125 Mbps<br>Mid Capacity: Up to 250 Mbps<br>Full Capacity: Up to 450 Mbps |

| | |
|---|---|
| Latency | 1 – 3 ms one-direction latency |
| QoS | 8 Queues |
| Packet classification | Layer 2 and Layer 3 IEEE 802.1p, MPLS, Ethernet priority |
| Packet performance | Line rate ( >850K packets per second) |
| Timing transport | Synchronous Ethernet; IEEE 1588v2[5] |
| Frame support | Jumbo frame up to 9600 bytes |
| Flexible I/O | 2 x Gigabit Ethernet copper ports:<br>Gigabit Port 1: Data + PoE power input<br>Gigabit Port 2: 802.3at PoE output port<br>SFP port (single-mode fiber, multi-mode fiber, and copper Gigabit Ethernet options available) |
| T1/E1 TDM support | 8 x T1/E1 TDM module (optional indoor unit)[5]<br>G.823-compliant timing<br>DC power input (compatible with AC+DC Power Injector output) |
| T1/E1 latency (one way) | 1 to 3 ms typical depending on range, bandwidth, modulation mode and number of T1/E1 ports; accurate T1/E1 latency figures can be determined for any given configuration using the Cambium PTP LINKPlanner |

## MANAGEMENT & INSTALLATION

| | |
|---|---|
| LED indicators | Power status, Ethernet link status, and activity on Extended Range PoE supply |
| Network management | In-band and out-of-band management (OOBM)[5] |
| System management | IPv6/IPv4 dual-stack management support<br>Web access via browser using HTTP or HTTPS/TLS[6]<br>SNMP v1, v2c and v3, MIB-II and proprietary PTP MIB<br>Cambium Wireless Manager, WM 4.0/SP4 or higher<br>Online spectrum analyzer (no impact on payload traffic or network operation) |
| Installation | Built-in audio and graphical assistance for link optimization |
| Connection | Distance between outdoor unit and primary network connection: up to 330 feet (100 meters) using Power-over-Gigabit Ethernet; longer distances up to 984 feet (300 meters) can be achieved using fiber interface |

## PHYSICAL

| | |
|---|---|
| Dimensions | Integrated Outdoor Unit (ODU):<br>Width 371mm (14.6"), Height 371mm (14.6"), Depth 81mm (3.2")<br>Connectorized ODU:<br>Width 204mm (8.0"), Height 318mm (12.5"), Depth 90mm (3.5") |
| Weight | Integrated ODU: 4.1 kg (8.95 lbs) including bracket<br>Connectorized ODU: 3.1 kg (6.8 lbs) including bracket |
| Operating temperature | -40° to +140° F (-40° to +60° C), including solar radiation |
| Dust-water intrusion protection | IP66 and IP67 |
| Wind speed survival | 200 mph (322 kph) |
| Power supply | Two options:<br>AC power injector: 32° to 104° F (0° to +40° C); 35 W; 90-240 VAC, 50/60 Hz<br>Dimensions: Width 5.2" (132mm), Height 1.4" (36mm), Depth 2" (51mm)<br>AC + DC power injector: -40° to 140° F (-40° to +60° C); 70 W; 90-240 VAC, 50/60 Hz<br>Dimensions: Width 9.75" (250 mm), Height 1.5" (40 mm), Depth 3" (80 mm) |
| Power consumption | 30 W maximum (up to 70 W with 802.3at device on auxiliary port) |

## ENVIRONMENTAL & REGULATORY

| | |
|---|---|
| Protection and safety | UL60950-1; IEC60950-1; EN60950-1; CSA-C22.2 No. 60950-1; CB approval for Global |
| Radio | 4.9 GHz: FCC Part 90Y, RSS-111<br>5.x GHz: FCC Part 15, sub-parts 15C and 15E; RSS 210 Issue 8;<br>EN 302 502; EN 301 893 Eire ComReg 02/71R1, UK Approval to IR2007 |
| EMC | Europe – EN 301 489-1 and -4 |

[1] Regulatory conditions for RF bands should be confirmed prior to system purchase. All bands use the same hardware. Individual bands and channel widths are available pending local regulatory approvals and region code licenses.
[2] Pending FCC authorization in North America.
[3] 5, 15, and 30 MHz channel widths will be available in a future release.
[4] Gain, maximum transmit power and effective radiated power may vary based on regulatory domain and region code license.
[5] Available in a future release.
[6] Web access via HTTPS/TLS is available on AES-enabled radios.







CN PTP 650 01-00 SS 102113

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