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Vivint Pandora360 Operating Instructions

Title		
Pandora360 Operating Instructions		
Id 805-SXC0002-001	**Type** Customer Operation Instruction	**Prepared** P. Estelius
Date 2018-09-22	**Security** Internal	**Revision** A

1. Introduction

Vivint Pandora360 is an outdoor (Multi)Point-to-Multipoint TDD radio in the unlicensed V-band (57-64 GHz) based on WiGig technology, IEEE 802.11ad. It can provide 2 Gbps user traffic in each direction (four directions giving 8 Gbps in total). Pandora360 comes in two versions, either with an additional LAN port, or with an SFP+ (10Gbps) port. It is powered by proprietary Power over Ethernet (PoE) or 48 VDC. When using 48 VDC power, alarm signals are also available from the UPS in the same cable as the DC cable. Operations and Maintenance is done via the LAN port or the or SFP+ port. (802.11b/g/n) is used for maintenance operations when a field technician is within close proximity to the equipment.

Pandora360 is used for broadband coverage, primarily for households.

Figure 1: A Pandora360 Node

The Pandora360 consist of four microwave radio nodes in one box. The internal "nodes" are physically placed 90 degrees apart and each lobe can be horizontally adjusted +/-40 degrees so that the sectors together covers 360 degrees. This provides four branches per node to connect with other Pandora360 nodes as required.
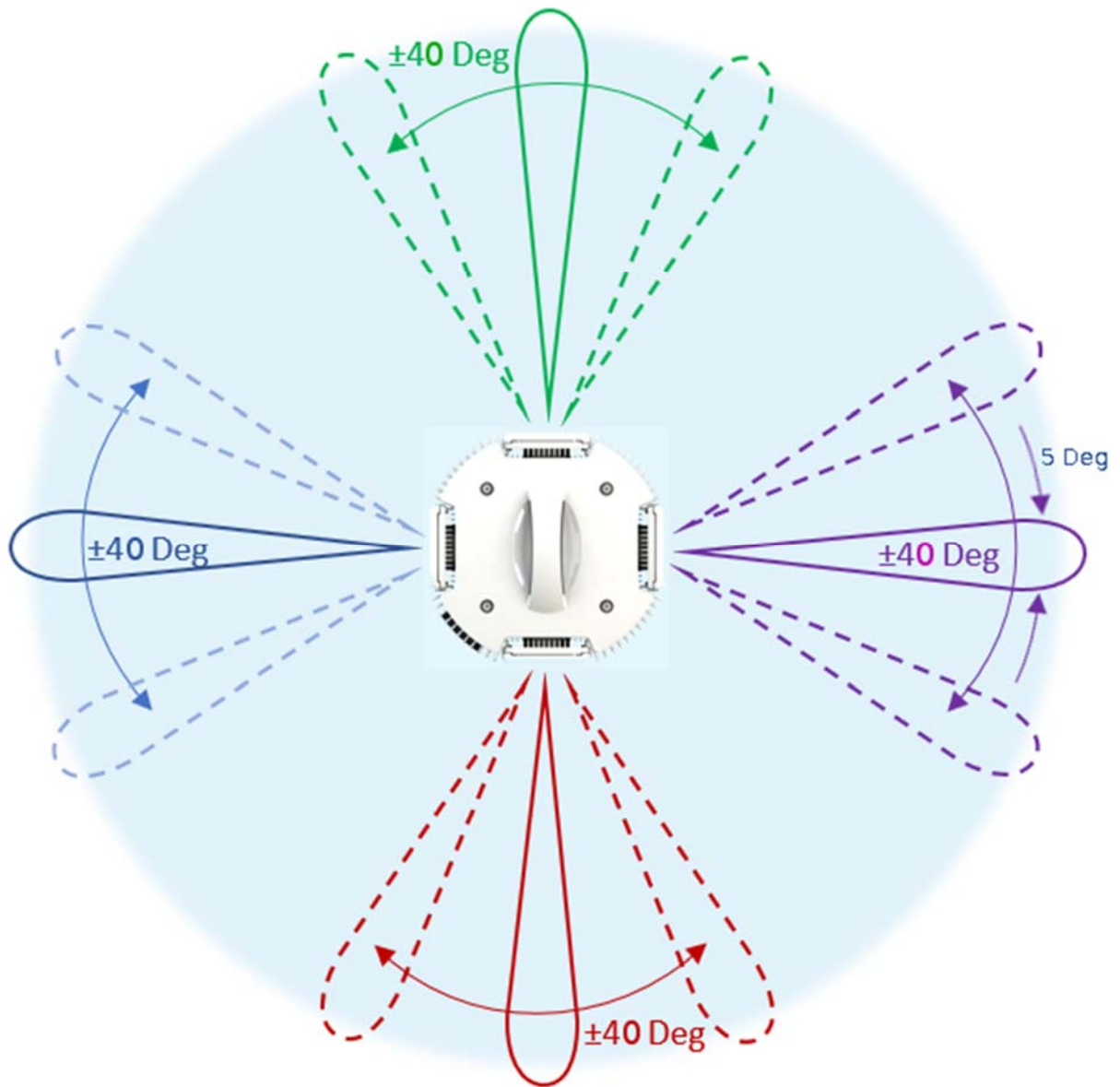
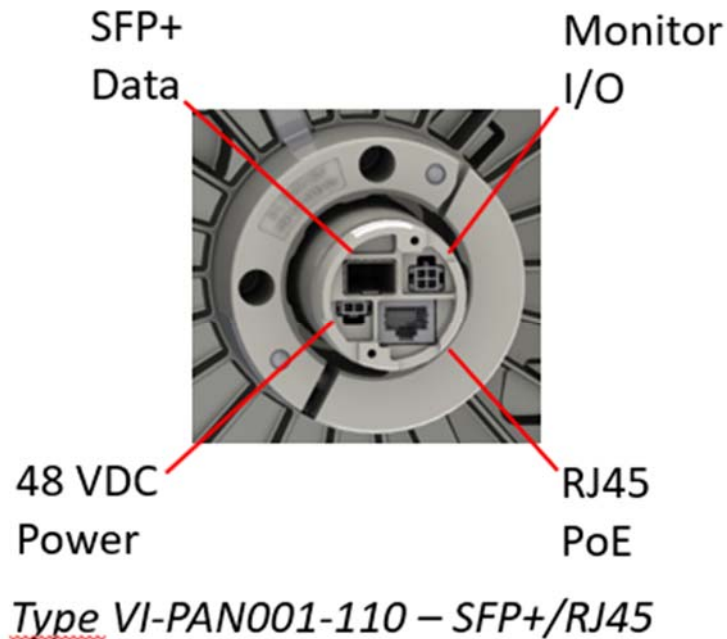Figure 2: Horizontal Radio Sectors on the Pandora360 Node,

The radio lobes can be vertically adjusted +/-15 degrees to cover uneven ground and different roof heights. All adjustments, both horizontally and vertically, are done electronically via software running on the Qualcomm baseband and RF chipset.

Figure 3: Vertical adjustment of the Pandora360 Radio Lobe.

The Pandora360 comes in two variants, one with two RJ45 Ethernet connections, and one for one RJ45 and one SFP+ Ethernet connection. Both variants deliver Gigabit connections on both inputs.
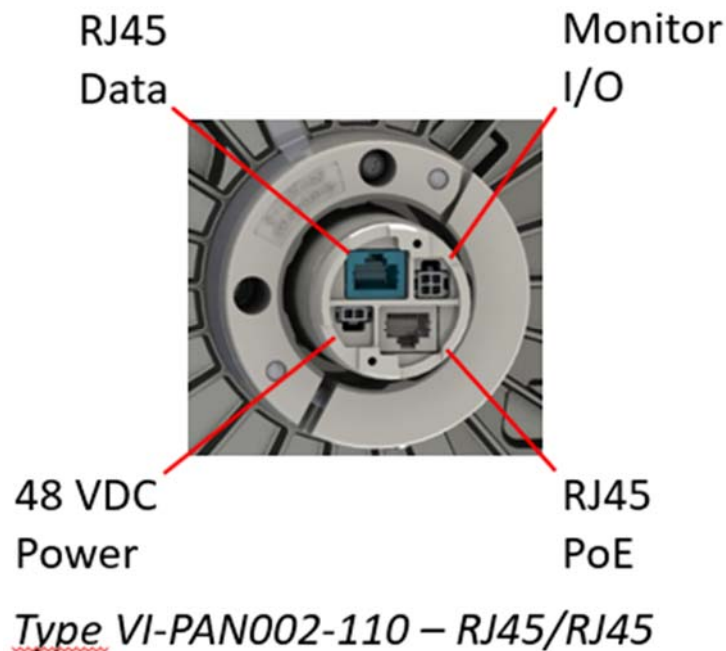

SFP+ Data

Monitor I/O

48 VDC Power

RJ45 PoE

Type VI-PAN001-110 – SFP+/RJ45

RJ45
Data

Monitor
I/O

48 VDC
Power

RJ45
PoE

Type VI-PAN002-110 – RJ45/RJ45

Figure 4: SFP+/RJ45 Connection Figure 5: RJ45/RJ45 Connections

2. Radio Frequency Exposure

This product complies with FCC radiation exposure limits for an uncontrolled environment. Avoid operating this product at a distance less than 11 in (28 cm) from the user.

3. Directions for Use

The Pandora360 is designed for outdoor use in broadband radio mesh setups. This means for example University campuses, local housing areas, etc. The small size makes it less obvious in the environment, and its WiFi management connection makes local management and maintenance from ground safe and easy for the maintenance personnel. The device can be installed in meshes with at least 200 nodes, all managed via a common network management system.

The Pandora360 node enables fast deployment of wireless broadband provisioning to end customers in smaller areas like smaller communities or housing areas. It comes with broadband internet through a so called Seed Node where the network first is connected, and then the broadband internet is delivered to the rest of the nodes in the network through short range wireless broadband microwave radios.

This kind of remote managed network provides the means for building the network at a pace fitting the area and must not be fully deployed before taken into use.

Hands on work on the equipment is only required at installation, or if service is required.

3.1. Preconditions

The preconditions for using a Pandora360 is that the installation and use in all parts follow what has been stated by the supplier and manufacturer.

All other uses must be clarified and approved by the supplier/manufacturer! If not it is regarded as a non-approved installation which will become the sole responsibility of the installer.

3.2. Intended Use

The Pandora360 is intended for outdoor use in broadband mesh configurations. It is managed and maintained remotely using the Node Management System software on a local PC through the network using the ACS and SNMP servers.

4. Installation Procedure

This section covers how to install a Pandora360 and make initial installation test before taking the node into operation.

NOTE: All cables used should be shielded.

4.1. Tools for Installation

The following tools are required to safely and correctly install a Pandora360 node.

Required:

- Power Tool with 10 mm socket (capable of a defined torque)
- Screwdriver (Philips Ph2)

In case of installation with -48V

- Cutting Plier
- Crimping Plier
- Knife

4.2. Unpacking

The Pandora360 comes in a wellboard box lined with specially cast plastic foam lining.

Start by cutting the box sealing tape and take out the parts. Each box includes the following parts:

- One Pandora360 Node.
- One bag with Strain Relief parts,
- One bag with Gasket and plugs for complete weather proofing of the different cable connections.

4.3. Installing

The Pandora360 node is installed as follows:

4.3.1. Pole Installation

Pandora360 installer's Tools will direct the installer where the unit can be located on the roof (typically a polygon is defined). The unit will need to report it's correct GPS position back to the IT systems to verify the node is installed at the correct site. (If this is not verified the installer will not be able to complete the installation process.) This roof-top location should be a place close to the top of the roof that allows for line-of-sight to neighboring nodes as provided by the planning data.

On the roof:

1. Mark the proper location for the pole as indicated by the Installer's Tool.
2. Check that line-of-site to adjacent Pandora360s are free.
3. Mount the foot and the pole on the roof so that the pole is truly vertical. (Make sure that the installation is done according to local regulations to prevent leaks etc.)
4. Mount the support struts for the pole.

4.3.2. Cable Installation

Use the following cable types for the installation:

Connection	Cable type/Part Number	Name
PoE & LAN	ECB0012/xxx	24 AWG CAT5e outdoor SFTP (Shielded Foiled Twisted Pair) cable, black
Optical Fibre Cable	ACC0004/xxx	LC-LC Single mode 1310 nm with short fanout because of strain relief for outdoor use
DC & I/O	ECB0014/xxx	(6x) 20 AWG shielded (foil and braid)

| Grounding | ECB0013/xxx | Grounding cable colors to be used, 10 AWG (6 mm^2) |
| SFP+ | EGE0015/xxxx | Finisar 10GBASE-LR,1310 nm, 1.4 km, SM, LC |

After collecting the applicable cables, do the following:

1. Pull the cables to be connected to the pole on roof top.
2. Pull the cables through the pole (from bottom to top).
3. The cables are either already terminated with appropriate connectors or can be terminated and crimped on the roof.
4. In case of field termination, crimp the connectors to the cables

4.3.3. Pandora360 Installation

Install the Strain Relief with the two MRT M3x8 screws to the bottom side of Pandora360 in preparation for cable connection.

Take the Pandora360 node together with sleeve gasket and sleeve gasket plug up on the roof to the point of installation.

1. Fit the Strain Relief Gasket and pull cable through.
2. Connect cables in the following order:
    1. Start with the grounding (GND) cables, make sure the grounding cable is properly terminated (Fork lug for 4mm screw) and well secured to the Earthing screw on the Strain Relief.
    2. Fit the Data cables (RJ45 or SFP respectively)
    3. Connect power cables
        1. If PoE is used to supply the Pandora360 with Power, make sure that the data connector is connected in the black RJ45 connector
        2. if DC feed is used, make sure also to connect the I/O cable
3. Secure the connected cables with the wing screw to the strain relief
4. Securing cables to be weatherproof
    1. Put the cables in sleeve gasket plug
    2. Make sure that unused slots have the correct dummy plugs inserted
    3. Put the plug in the sleeve gasket
    4. Slide the sleeve gasket in place and make sure ~~that the its~~it fits in to the grove on Pandora360 node
5. Fit node end into pole while gently pulling the cables out at the foot of the pole
6. Rotate to desired orientation.
7. Tighten the C-clamp screw according to torque requirements.
8. Make a service loop of the cable at bottom of pole

4.3.4. Testing the Installation

As soon as the Pandora360 node is connected to the network, it automatically registers itself towards the Vivint System which sends the appropriate configuration to the node, The node then automatically applies the new configuration and is from then on an active part in the network.

While the node restarts with the new configuration, the network management personnel monitors the activities via the Network management System and waits for OK on:

- Connected to another mesh node.
- Connected to the ACS.
- Configuration update complete.
- GPS locked.
- Customer port online and connected.

The webGUI illustrates the status off these different steps. The installer will get an OK once the new configuration is running.

This completes the physical installation.

4.3.5. Software Installation

Before a node can be put into operation at a customer site, a customer record must be created in Vivint's IT system. The installation process assumes that a customer record and an equipment record exists in Vivint's IT systems. On site an installer will scan the node (label on the Pandora360 node) in order to register the node and connect it with the customer site. At the point of scan, the customer record and the equipment are linked to each other. This is a critical point at which the configuration for the unit is available through the ACS. Without the scan the equipment will not be registered with a customer and hence it will not be able to pull a valid configuration from ACS and would not be able to authenticate through 802.1X.

The feedback the installer needs from the scanning is:

- Is the node of correct type?
- Is the site an LTE site and if this is the case, which IPv6 needs to be configured on the LTE eNB?
- Feedback of what type of electrical installation is needed:
    - Battery backup (48V DC)
    - No battery backup (PoE+)

In case a node is already registered with a site and needs to be replaced, the old equipment is disassociated with the user account (equipment is removed from ACS but site config maintained). When the replacement unit is scanned the customer record will be updated through the ACS and the new node will be configured in the same way as the old unit.

With that the installation is fully tested and in operation.

5. Technical Specification

The technical Specifications of the Pandora360 node are as follows:

		Comment
Type(s)	VI-PAN001-110 VI-PAN002-110	SFP+/RJ45 Unit RJ45/RJ45 Unit
Model	CE04	
Radio Type	(Multi)Point-to-Multi-Point Radio	Occupied Bandwidth: 1760 MHz with 2160 MHz as channel separation according to IEEE 802.11ad
Size	240x240x300 mm	
Weight	4,5kg	
Pole Size	50 mm (2")	**NOTE:** The pole shall be made of corrosion resistant material and have a protective coating to at least fulfill the Outdoor Corrosion Requirements for TYPE 3S ENCLSOURE in UL 50E.

Power Supply	48 VDC, or Proprietary PoE	Nominal 53VDC (42.5-57VDC), 1A max. Input: 53VDC (42.5-57VDC), 1A max
No of Radios	4	Placed 90 degerees apart.
Radio Lobe Width (Deg)	Approx. 5 degrees	
Antenna Gain	23 dBi	Effective
Output Power (EIRP)	40 dBm average, 41 dBm peak	Max values measured at 3 meters
Power Consumption	40 W max	
Operating Frequency	58.32-62.64 GHz	TDD/TDMA. Channel 1: 58.32 GHz Channel 2: 60.48 GHz Channel 3: 62.64 GHz
Traffic connections	2xRJ45, or 1xSFP+ & 1xRJ45	
Capacity RJ45	10/100/1000BASE-T	
Capacity SFP+	10GBASE-LR	

		For remote node management. (2.4 GHz only with Channels 1 to 11) with FCC & IC ID
WiFi Connection	IEEE 802.11b/g/n	
GPS	Yes	
Distance Between Nodes	Max: 300 m	
Usage	Outdoor	
Operating Temperature	-40°C to +55°C (-40°F to +131°F),	
Relative Humidity Range	4-100%	
Environment	TYPE 3S ENCLOSURE, IP65	When properly installed (inserted and secured) on the pole. The pole is part of the TYPE 3S ENCLOSURE & IP65 setup.
Voltage Marking	⎓ DC	Used for both 48 VDC and PoE.
Protective earth	⏚	Used as functional earth.

6. Fault, Possible Causes, and Remedies

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This secction covers a number of faults, their possible causes, and what can be done to remedy the fault.

Fault	Poss. Cause	Remedy	Comment
Loss of signal	No Power	Make sure that power is ON. Make sure that power supply fuses are good. Make sure the line-of-sight for the radio is un-obstructed.	Powered by PoE, check that the Modem/Router has power. Powered by 48 VDC, check that the PSU works.
Loss of data	No signal	Make sure that the connections are correctly inserted. Check with network provider if there is any problem with the network.	Double-check all equipment connections. Check if there is a problem with the data signal from the Modem or Router
Access Denied	No data	Check with your network provider if there are any network disturbances.	Restart the node.

Caution: The Pandora360 may be powered by more than one power source to ensure uninterrupted service. To de-energize a Pandora360, disconnect all power sources.

7. Standards

We

Vivint, Inc. 4931 N. 300 W. Provo, UT 84604 USA

declare under our sole responsibility that the product Pandora360 (M/N: CE04) complies to the following standards:

- Radio Spectrum: FCC Part 15 – §15.255 & §15.247 and IEEE 802.11b/g/n/ad
- EMC: FCC Part 15 - §15.207 & §15.209, IEC/EN 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5 and 61000-4-6.
- Safety: UL/IEC/EN 62368-1, UL/IEC/EN 60950-22, UL 50E and IEC/EN 60529
- Safety Human Exposure: Part 15 - 15.247(i), § 15.255(g), Part 1 - § 1.1310 and FCC OET BULLETIN 65

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

NOTICE:

Changes or modification not expressly approved by Vivint could void the user's authority to operate this equipment.

FCC ID: 2AAAS-CE04
Contains FCC ID: Z64-WL18SBMOD (2.4 GHz 802.11b/g/n radio)

ETL LISTED:

Conforms to ANSI/UL Std. 62368-1.
Certified to CAN/CSA Std. C22.2 No. 62368-1

8. Glossary

This glossary includes acronyms, abbreviations and other special expressions used in this document.

PoE	Power over Ethernet, way of powering equipment thrpough an Ethernet cable.
SFP	Small Form-factor Pluggable transciever, type of connector.