Vanu® CompactRAN™ CDMA/GSM Base Station Hardware Installation Guide

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CONTENTS

PREFACE

This document provides the information for the Vanu® CompactRAN CDMA/GSM base station hardware installation. The following table lists the sections and topics of this guide.

Chapter	Title	Description
1	Overview	Provides a brief overview of the CompactRAN CDMA/GSM base station.
2	Preinstallation Checklist	Provides a list of hardware, software, and network information needed to install the CompactRAN CDMA/GSM base station.
3	Preparing the CompactRAN for Installation	Provides information on installing the ConfigureCell™ tool software on the installation laptop. This software is used to make sure the CompactRANs are working correctly before installing them onsite.
4	Installing the CompactRAN CDMA/GSM base station	Provides information needed to install the CompactRAN CDMA/GSM base station on the mounting pole or a wall.
5	Additional Information	Provides information on antennas, checking the CompactRAN firmware version, and disposing of equipment.

AUDIENCE

Note: This guide is intended for operators who install, configure, and upgrade the Vanu GSM software. You should be familiar with the following:

- Linux®
- Radio Access Networks (RAN) standards and terminology
- Networking fundamentals
- Wiring fundamentals

CONVENTIONS

Notes and Cautions call attention to certain topics. To avoid loss of data or to make most efficient use of the product, please devote special attention to these areas.

Note: This symbol calls attention to additional information that may be of practical use in following a procedure or understanding a concept.

Caution: This symbol indicates issues or practices that could damage the equipment or cause loss of data if you disregard the required safety precautions.

WARNING: This symbol indicates issues or practices that could damage the equipment or cause bodily harm or death if you disregard the required safety precautions

VANU TECHNICAL SUPPORT

For questions about any Vanu products, contact:

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- US: 1.617.864.1711, option 5
- India: +91-80-49196868

E-mail: techsupport@vanu.com

Technical support is available for products and services provided by Vanu. If you need assistance with any product or service not provided by Vanu, consult the respective vendor's user manual for technical support information.

1

OVERVIEW

The CompactRAN CDMA/GSM base station is a small, lightweight, low power consumption outdoor base station. The Service Enclosure is a cabinet containing an AC-powered UPS, a battery, and the CDMA baseband processor. A bracket is used for pole-mounting or wall-mounting. The CompactRAN CDMA/GSM base station can be installed in hard to cover outdoor areas such as rural areas, spot fill-in on highways, or in rugged terrain areas. It can be mounted on poles or alternative structures, eliminating the need to place equipment on the ground.

This document provides the information needed to install the CompactRAN CDMA/GSM base station:

- Preinstallation Checklist
- Preparing the CompactRAN for Installation
- Installing the CompactRAN CDMA/GSM base station
- Additional Information

Figure 1-1. CompactRAN CDMA/GSM Base Station

2

PREINSTALLATION CHECKLIST

Before you physically install the CompactRAN CDMA/GSM base station, you must make sure you have completed the following preinstallation requirements:

Caution: Do NOT disassemble the CompactRAN CDMA/GSM base station casings. Contact Vanu Technical Support for any hardware issues.

TECHNICAL SPECIFICATIONS

The following is a list of the technical specifications for the CompactRAN CDMA/GSM base station:

- Output power
  - One GSM TRX 5 Watts average power
  - One CDMA TRX 2 Watt average power
- Input Power
  - 95 -140V AC
  - 60 Hz
  - 3 amp Max

Environmental Specifications

Table 2-1. Environmental Requirements

Environmental Requirement	Description
Operating Temperature	-40C (-20 cold start) to 50C (-40F (-4 cold start) - 122F)
Storage Temperature	-40C to 70C (-40F - 158F)
Operating Humidity	Maximum humidity up to 100%

Physical Specifications

Table 2-2. Physical Specifications

Attribute	Description
Height	53.3 cm (21 in)
Width	58.4 cm (23 in)
Depth	25.4 cm (10 in)
Weight	22.7 Kg (50 lbs.)

HARDWARE PACKING LIST

Unpack the following items and check for damages:

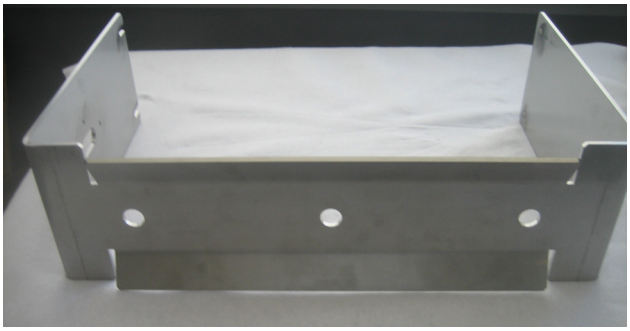
Vanu Equipment

- CompactRAN CDMA/GSM base station (Figure 2-1).

Figure 2-1. CompactRAN CDMA/GSM Base Station

- Mounting bracket - 1 (Figure 2-2)

Figure 2-2. Mounting Hardware



Third-Party Equipment

- Dual RX/TX antennas and cables terminated with male N-Type connectors, recommended 8 dBi maximum gain
- GPS Antenna and cable terminated with male SMA connector - Recommended GPS antenna is Trimble Bullet™ III 57860-20
- Lightening protection devices for outdoor antennas
- Backhaul modem for Internet connection - power is provided inside Service Enclosure

Additional Equipment

You also need the following to install the CompactRAN CDMA/GSM base station:

- Windows® Installer laptop, runnings Windows 7 or later
- Mobile phone for testing
- Power source
- Ethernet connection
- Phillips head screw driver
- Wrench
- 7/16 in socket to open the Service Enclosure
- Digital multi-meter
- Three Hex Head 5/8” Lag Screws, 4” long for mounting on pole or wall

PREINSTALLATION REQUIREMENTS

Before you begin installing the CompactRAN CDMA/GSM base stations, refer to the following checklist:

- Make sure the Vanu software is installed on the servers. This software includes ConfigCenter. Refer to the *Vanu Software Installation Guide*.
- Obtain a site plan from the network administrator that provides the following information:
  - Physical installation location of each CompactRAN CDMA/GSM base station.
  - Power source/requirements
  - Network source/requirements
  - Temperature ranges
  - IP addresses for each CompactRAN CDMA/GSM base station
- Install the following antennas at each site using the product-specific documentation:
  - GPS antenna
  - RX antenna
  - TX antenna
- For installations with a VPN:
  - VPN Gateway IP address and subnet mask
  - User ID and password
  - IPSec PSK - PSK group and key
  - IPSec Certificate - username, password CA certificate, Device certificate

Note: You can only use IPSec PSK or IPSec Certificate. You cannot use both at the same time.

3

PREPARING THE COMPACTRAN FOR INSTALLATION

Note: This chapter is applicable only if you are using an open VPN.

This chapter provides the information needed to prepare the CompactRAN before physically installing the CompactRAN CDMA/GSM base station. The preinstallation procedure is divided into two stages:

- Installing the Vanu ConfigureCell Tool onto the installation laptop.

  This procedure is done once. Refer to Installing the ConfigureCell Tool.

- Network Configuration

  This procedure is performed for each CompactRAN. Refer to Setting Up the CompactRAN.

INSTALLING THE CONFIGURECELL TOOL

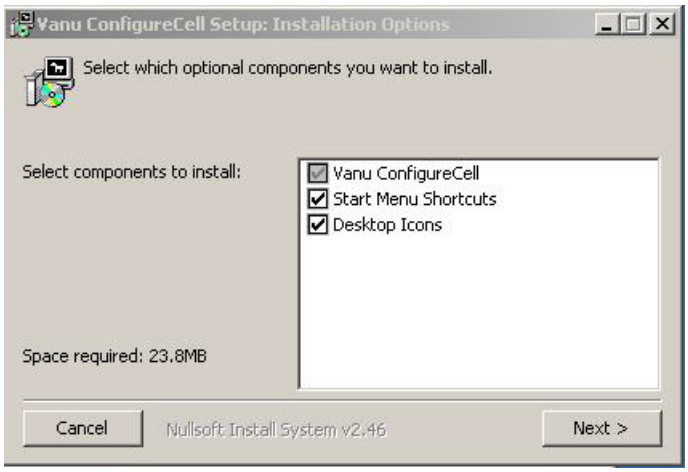
The section provides information for the installing the ConfigureCell tool. This tool is installed on the Windows installation laptop.

Note: You need at least 23.8 MB of disk space.

1. Download the **Vanu-ConfigureCell-Installer-Installer** from the `Vanu Local Management Terminal Installer` **onto the installation laptop.**
2. Click **Vanu-ConfigureCell-Installer.exe**.

   The Vanu ConfigureCell Setup Installation Options dialog box displays (Figure 3-1):

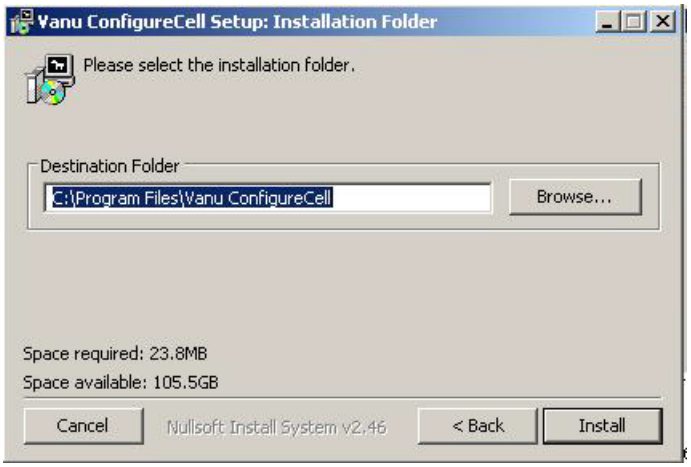
   Figure 3-1. Vanu ConfigureCell Setup Installation Options Dialog Box



3. Make sure **Vanu ConfigureCell** is selected and click **Next**.

   The Vanu ConfigureCell Setup Installation Folder dialog box displays (Figure 3-2):

Figure 3-2. Vanu ConfigureCell Setup Installation Folder Dialog Box



4. Enter the **folder** name for where you want to install the ConfigureCell tool.

Note: It is recommended that you use the default folder.

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5. Click **Install**. The installer runs.
6. Click **Close** after installation completes.

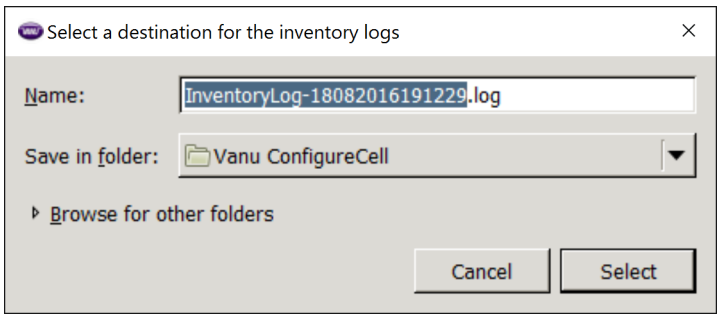
SETTING UP THE COMPACTRAN

Complete the following steps to set up the CompactRAN:

1. Determine the IP address, subnet masks, and gateway that is assigned to the CompactRAN.
2. Select **Start > All Programs > Vanu ConfigureCell Tool**.

   The Vanu Select destination for the inventory logs screen displays (Figure 3-3).

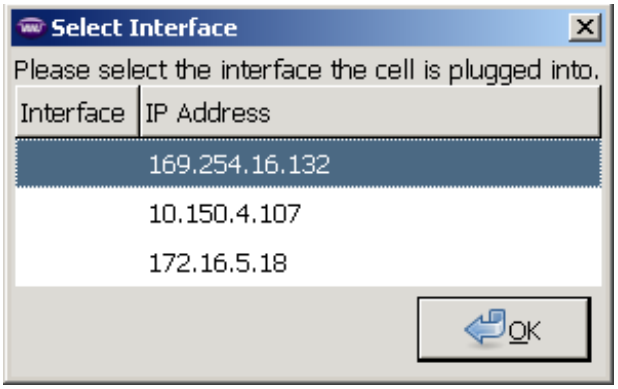
Figure 3-3. Select Destination for Inventory Logs Screen



3. Click **Select**.

   The Select Interface screen displays (Figure 3-4).

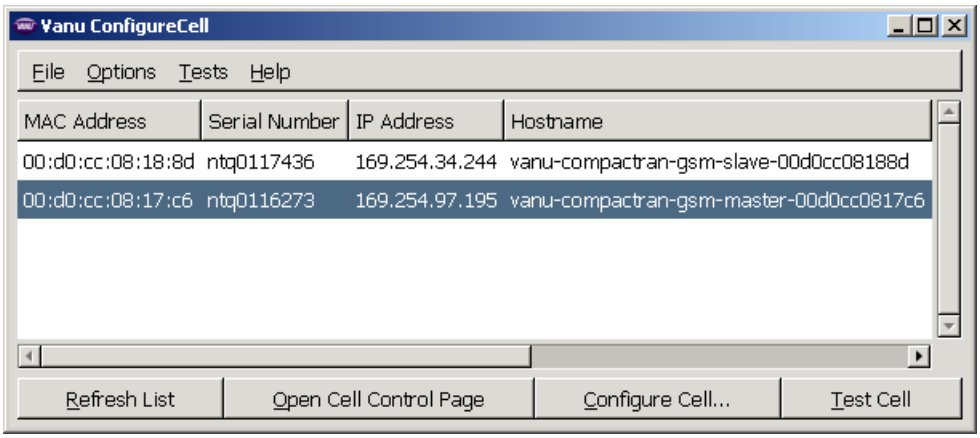
Figure 3-4. Select Interface Screen



4. Select the temporary IP address of the CompactRAN.
5. Click **OK**.

The Vanu ConfigureCell screen displays (Figure 3-5).

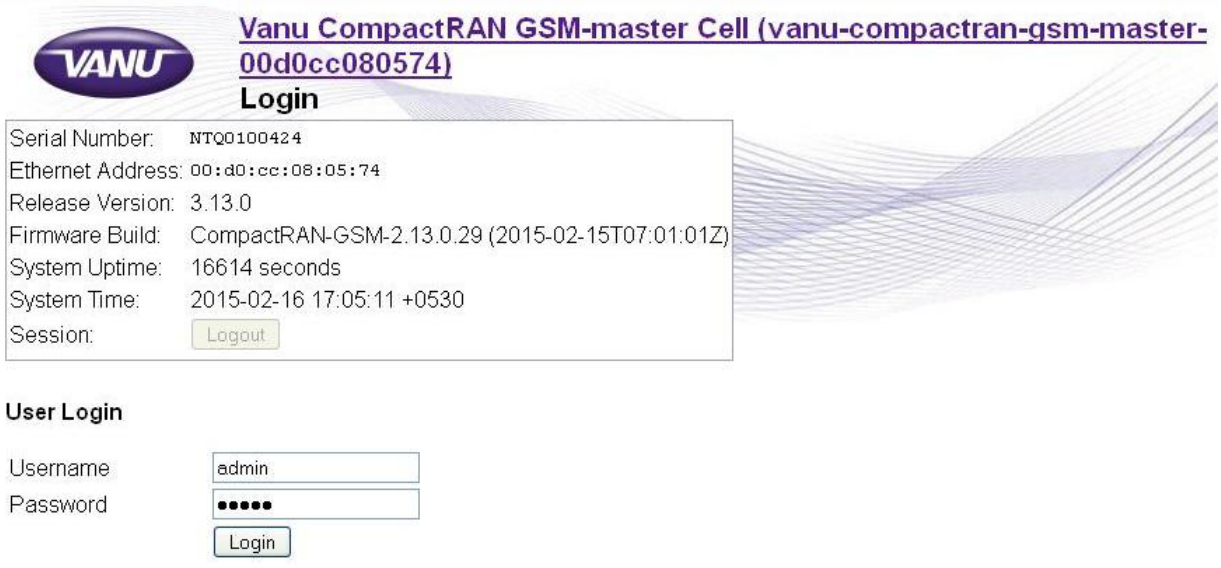
Figure 3-5. Vanu ConfigureCell Tool



6. Select the CompactRAN that you are verifying.
7. Click **Open Cell Control Page**.

   The login screen displays (Figure 3-6).

Figure 3-6. Login Screen



8. Enter the **Username**.

Note: If you are logging in for the first time, the default Username is **admin**. The default Password is **admin,**

You are then prompted to change the Password. Refer to Changing the Password. Refer to Restrictive Password Requirements for more information on the password policy.

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9. Enter the **Password**.

10. Click **Login**.

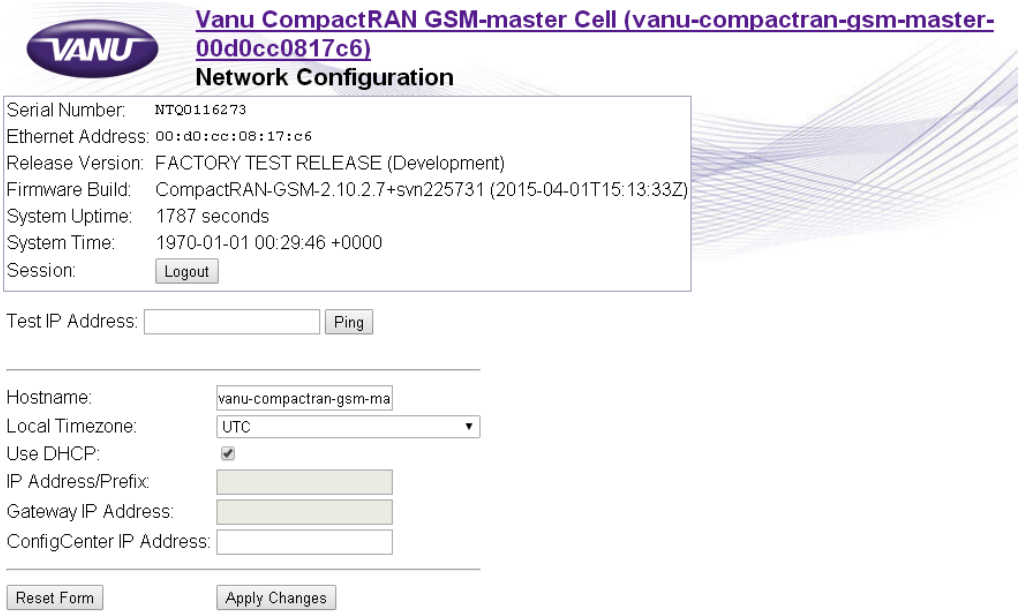
The Vanu CompactRAN Control screen displays. (Figure 3-7).

Figure 3-7. Control Screen

11. Click **Network Configuration**.

The Vanu CompactRAN Configuration screen displays (Figure 3-8).

Figure 3-8. Vanu Network Configuration Screen



12. Enter the following information (Table 3-1):

Table 3-1. Network Configuration Information

Field	Description
Host Name	Enter the host name.
Local Time Zone	Select the time zone from the drop-down list.
Use DHCP	Select to enable DHCP. **Note:** It is recommended that you enable Use DHCP.
IP Address/Prefix	Enter the IP address and prefix for the CompactRAN.
Gateway IP Address	Enter the Gateway IP address.
ConfigCenter IP Address	Enter the ConfigCenter IP address the ConfigCenter IP address.

13. Click **Apply Changes**.

14. Disconnect the CompactRAN from the installer laptop Ethernet.

Changing the Password

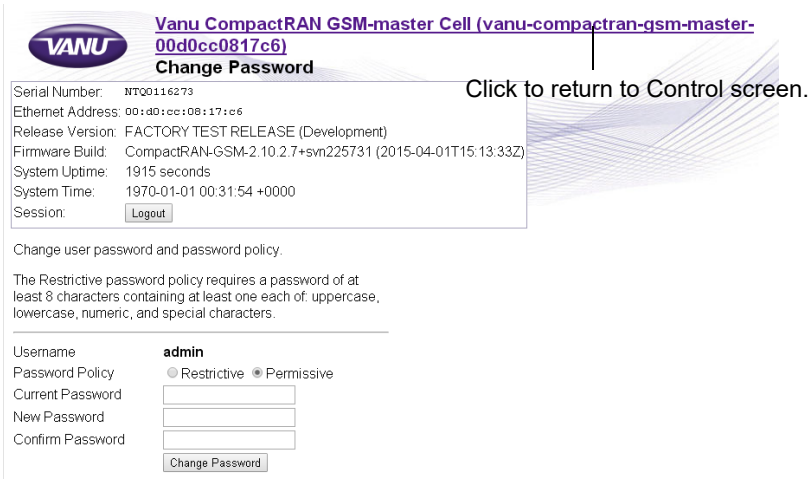
The section provides information for changing the ConfigureCell tool password.

Complete the following steps to change the password:

1. Click **Change Password** (Figure 3-7).

   The Change password screen displays (Figure 3-9).

Figure 3-9. Change Password Screen



2. Enter your **Username**.
3. Select the **Password Policy**. Options are:
   - Restrictions - Refer to Restrictive Password Requirements.
   - Permissive - Password is case-sensitive.
4. Enter the **Current Password**.
5. Enter the **New Password**. Refer to the Restrictive Password Requirements for more information.
6. Re-enter the **New Password**.
7. Click **Change Password**.

Restrictive Password Requirements

The following list provides the password requirements:

- The password must contain the following:
  - Upper case character
  - Lower case character
  - Special character
  - Numerical character
  - At least eight characters long. For example, Vanu@123 is a valid password.
- The account locks out for 60 minutes when you enter the wrong password 5 consecutive times.

The last five passwords may not be reused. The password history is enforced.

4

INSTALLING THE COMPACTRAN CDMA/GSM BASE STATION

This chapter provides the information necessary to install the CompactRAN CDMA/GSM base station in the field.

Before installing the CompactRAN CDMA/GSM base station, make sure you have:

- Installed the server software and ConfigCenter. Refer to the *Vanu Software Installation Guide.*
- Set up the power source
- Set up the Ethernet source

Caution: Do NOT disassemble the CompactRAN CDMA/GSM base station casings. Contact Vanu Technical Support for any hardware issues.

WARNING: Read Installation Warnings before beginning to install the CompactRAN CDMA/GSM base station. Failure to follow the warnings and cautions may result in bodily injury or damage to the CompactRAN CDMA/GSM base station equipment.

REGULATORY INFORMATION

This section provides the regulatory information:

- The CompactRAN GSM/CDMA base station Model V2-CR-GC-19-02 is compliant with FCC Title 47 Part 24
- Changes or modifications not expressly approved by Vanu Inc. may void the user's authority to operate this equipment.

INSTALLATION WARNINGS

Note: These notices will be provided in both English and French when the product is marketed or sold in Canada.

Make sure you heed the following installation warning to ensure a safe installation.

WARNING: The operator/administrator of the system must obtain authorization to operate a transmitter in accordance with FCC regulations. It is the responsibility of the operator to ensure they have all required authorizations.

WARNING: The CompactRAN GSM/CDMA Base station installation should be performed by trained personnel only.

WARNING: Because of the weight of some of the CompactRAN GSM/CDMA Base station, the installation should be performed by TWO trained installers.

WARNING: **The CompactRAN GSM/CDMA base station must be installed in accordance with all applicable national electrical codes.**

WARNING: **Make sure to avoid power lines when installing the CompactRAN GSM/CDMA base station. When installing the CompactRAN GSM/CDMA base station in an outdoor location, you should use a lightening protector for all indoor components, for example, Ethernet and power connections. This will protect the equipment if the CompactRAN GSM/CDMA base station is struck by lightening. It is recommended that the lightening protector be installed where the Ethernet and power cables enter the building. Follow the installation instructions provided with the lightening protection device.**

WARNING: **All third-party equipment, like the lightning protection, should include a grounding cable if needed**

WARNING: **The CompactRAN GSM/CDMA base station is intended to be installed outdoors. In accordance with EN 62311 and related standards, humans should be more than 2 m (6.6 ft) away from the CompactRAN GSM/CDMA base station and its transmit antenna during operation.**

WARNING: **When attaching the CompactRAN GSM/CDMA base station to a pole, make sure the pole is part of a conductive structure that is grounded OR attach a grounding cable to the mounting bracket**

WARNING: **When attaching the CompactRAN GSM/CDMA base station to a wall, make sure a grounding cable is attached to the mounting bracket.**

WARNING: **Do NOT connect any equipment to the power outlet if the power cable, power outlet, or equipment is damaged.**

Caution: **Do not allow food or drink near any of the associated equipment.**

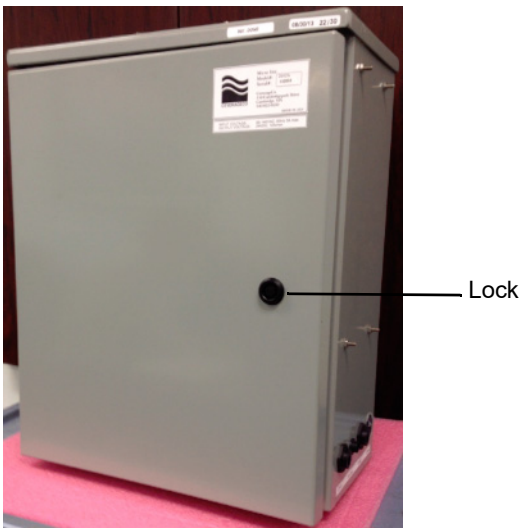
Caution: **Do NOT disassemble the CompactRAN GSM/CDMA base station. Contact** Vanu Technical Support **for any hardware issues.**

CompactRAN CDMA/GSM Base Station Visual Checks

Before installing the CompactRAN GSM/CDMA base station, perform the following visual checks:

1. Use the 7/16 in socket to open the lock of the Service Enclosure (Figure 4-1).

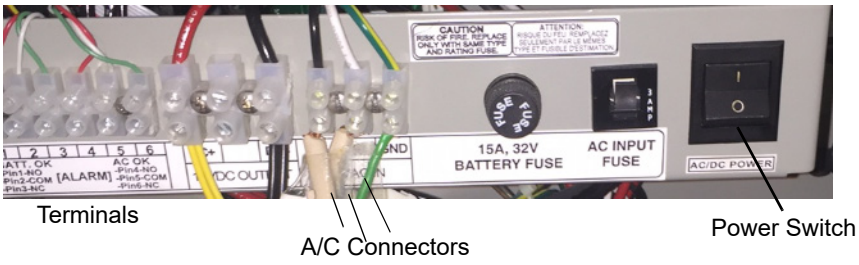
Figure 4-1. Service Enclosure



Caution: Make sure the AC power is OFF (Figure 4-2).

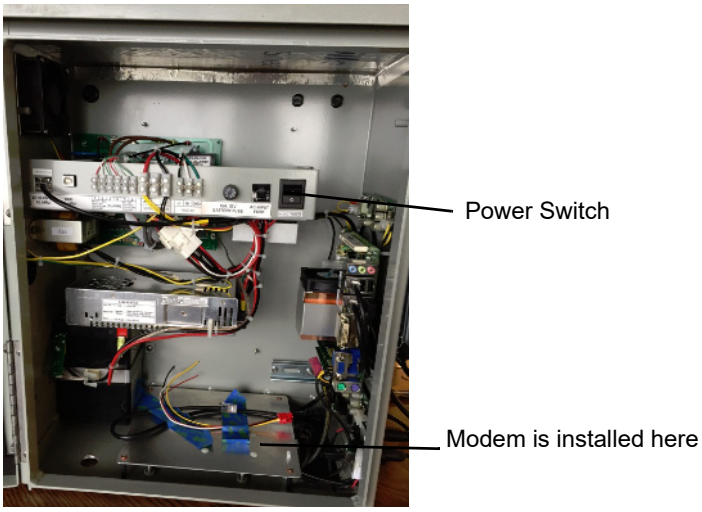
2. Connect the AC cable from the power source to the AC terminals (Figure 4-2).

Figure 4-2. Terminals and AC Connectors



3. Turn on the AC power source.
4. Turn on power to the CompactRAN GSM/CDMA base station (Figure 4-3).

Figure 4-3. Service Enclosure (Opened)



5. Check continuity of terminals 2 and 3 using digital multi-meter (Figure 4-2).

   Open indicates a battery alarm.

6. Check continuity of terminals 5 and 6 (Figure 4-2).

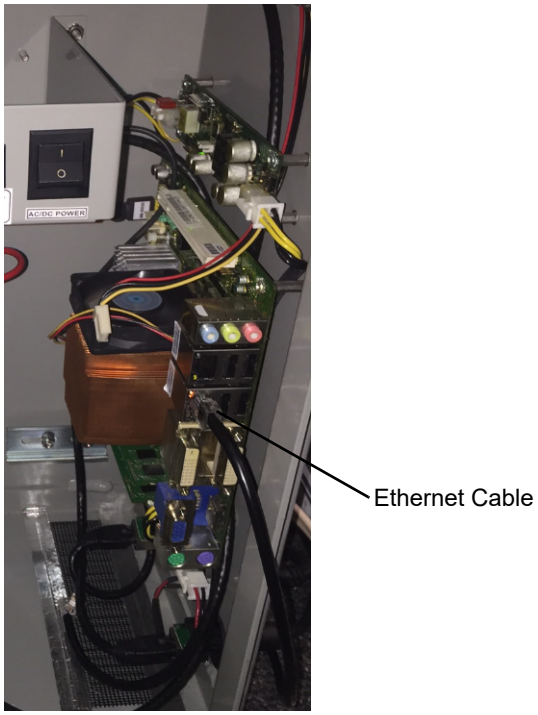
   Open indicates AC failure.

7. Check the 12 VDC bus voltage.

   On the battery alone, it can range from 6 to 12 VDC. With AC power supplied, it should be slightly above 12 VDC.

8. Make sure the Green LED on the top 12 VDC supply board is lit.
9. Check SBC fan operation to make sure it is powered up.

Figure 4-4. Ethernet Cable



10. Install the backhaul modem on the shelf and connect power to it **BEFORE** you connect the Ethernet cable (Figure 4-3).

    The Service Enclosure has a lower shelf for holding and powering a backhaul modem (25 Watts maximum)

    There is a replaceable 3A low-voltage fuse, and several voltages are provided for different modem types:

    - BLACK is ground
    - WHITE is 12 VDC
    - YELLOW is 18 VDC
    - RED is 5 VDC

11. Connect the backhaul modem to one of the LAN ports inside the Service Enclosure using a Cat 5e Ethernet cable (Figure 4-4).

12. Make sure the green LED on the bottom 24 VDC supply board is lit.

13. Turn off the power to the Service Enclosure (Figure 4-3).

14. Close the Service Enclosure and lock it with the 7/16 in socket (Figure 4-1).

INSTALLING THE COMPACTRAN CDMA/GSM BASE STATION

Caution: **Refer to Installation Warnings before installing the CompactRAN GSM/CDMA base station.**

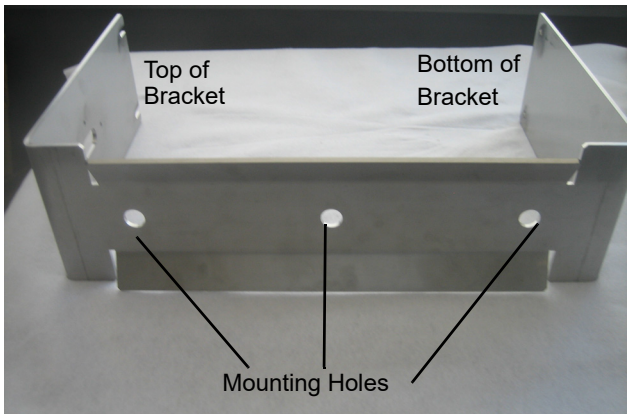
WARNING: **If you are installing the CompactRAN GSM/CDMA base station to a wall, make sure there are no electrical cables behind the wall.**

Complete the following steps to attach the CompactRAN GSM/CDMA base station to the pole or wall:

1. Align the mounting bracket on the pole or wall (Figure 4-7).

Note: Make sure it is level.

Figure 4-5. Mounting Bracket



2. Secure the mounting bracket with the three (3) Hex Head 5/8” Lag Screws, 4” long.

3. Remove the nuts from the screw posts on top of the CompactRAN CDMA/GSM base station (Figure 4-6).

Figure 4-6. Attaching the Bracket to the Service Enclosure

4. Slide the CompactRAN CDMA/GSM base station onto the mounting bracket.

   Align the screw holes on the bottom of the CompactRAN CDMA/GSM base station with the bracket screw holes.

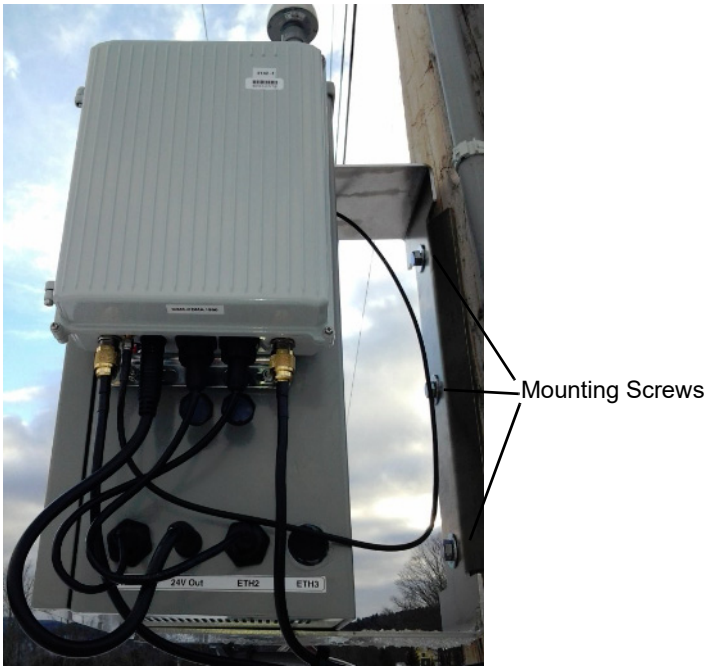
5. Align screw posts on the top of the CompactRAN CDMA/GSM base station with the slots on the top of the mounting bracket.

6. Secure the bottom of the CompactRAN CDMA/GSM base station with the screws.

7. Replace and tighten the nuts on the screw posts on the top of the CompactRAN CDMA/GSM base station (Figure 4-6).

Figure 4-7 shows the CompactRAN CDMA/GSM base station installed on a pole.

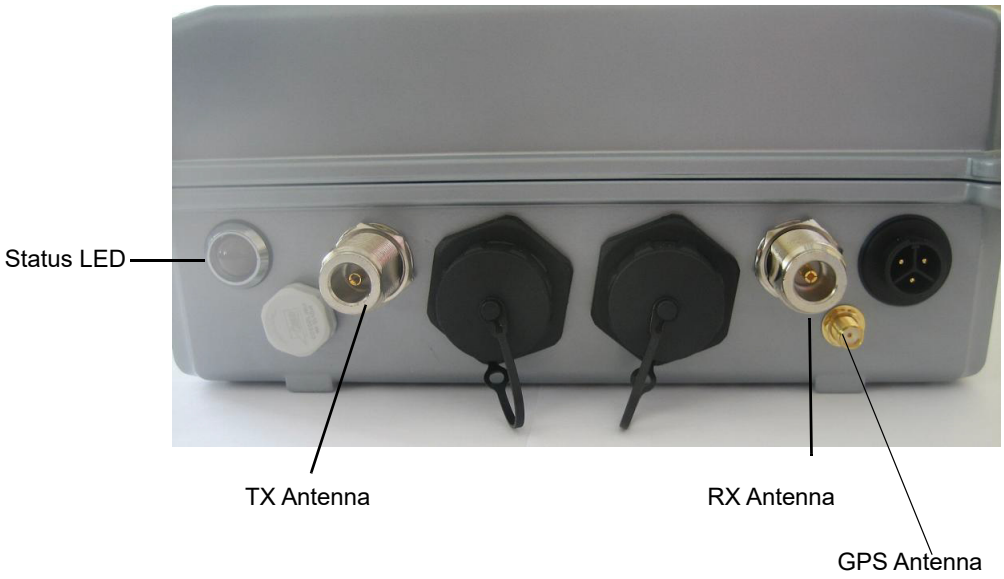
Figure 4-7. CompactRAN CDMA/GSM Base Station Installed



CONNECTING TO THE NETWORK

After installing the CompactRAN GSM/CDMA base station on the pole wall, you need to connect the GPS, RX and TX antennas to the CompactRAN GSM/CDMA base station (Figure 4-8) and then connect the CompactRAN GSM/CDMA base station to the power supply and the network.

Figure 4-8. CompactRAN Antenna Connectors



1. Connect the TX antenna.
2. Connect the RX antenna.
3. Connect the GPS antenna.

Caution: **The antennas should be connected before the Service Enclosure is powered on; otherwise, damage may result.**

4. Connect the backhaul using the modem inside the Service Enclosure.
5. Connect to the power source.
6. Open Service Enclosure and turn on the power switch (Figure 4-1).

7. Close and lock the Service Enclosure.

CompactRAN LEDs

The LED on the CompactRAN (Figure 4-8) should light. Refer to Table 4-1 for LED status information.

Table 4-1. LED Status

LED State	Check:
Solid Red	Preprovisioned - Indicates connectivity to core network and the CompactRAN cell needs to be provisioned.
Slow Flashing Red	The CompactRAN's VPN connection is not up. The LED alternates between Off and Red every second.
Fast Flashing Red	The CompactRAN has no backhaul (No IP on the Ethernet connection). The LED alternates between Off and Red four times a second.
Solid Orange	The CompactRAN encountered an error contacting or working with ConfigCenter.
Slow Flashing between Orange and Red	The CompactRAN's GPS has no lock. The LED alternates between Orange and Red every second.
Fast Flashing between Orange and Red	The CompactRAN's Auxiliary Interface is down (CDMA or second TRX, depending on hardware options). The LED alternates between Orange and Red four times a second.
Solid Green	All waveforms are functioning. Primary GSM TRX and Secondary TRX, or Primary GSM TRX and CDMA (depending on hardware options).
Slow Flashing Green	This indicates the CompactRAN waveforms are initializing. It is trying to connect to ConfigCenter, performing a firmware update, or snapshot activation. The LED alternates between Off and Green every second.
Fast Flashing Green	One or more waveforms or TRX are not functioning. The LED alternates between Off and Green four times a second.

5

ADDITIONAL INFORMATION

This section provides troubleshooting information. It contains the following sections:

ANTENNA INFORMATION

This section provides additional information about the antennas.

Connecting the Antenna

The antennas should be connected before the CompactRAN CDMA/GSM base station is put into service; otherwise, damage may result.

Antenna Notes

- The required TX/RX antenna isolation is 45dB at 900MHz, and 35dB at 1800MHz. A lesser isolation may lower the RX sensitivity.
- Two omnidirectional antennas mounted with horizontal separation is **NOT** recommended

- Two omnidirectional antennas mounted with vertical separation should provide adequate isolation, however care must be taken to account for the proximity to the mast structure.
- 8 dBi maximum gain is recommended for best trade-off between vertical beam width and range.

VERIFYING THE FIRMWARE

Caution: It is RECOMMENDED that you use ConfigCenter to update the firmware. Contact Vanu Technical Support before updating the firmware using the following procedure.

Complete the following steps to update the CompactRAN firmware using the ConfigureCell tool:

Note: Repeat these steps for each CompactRAN.

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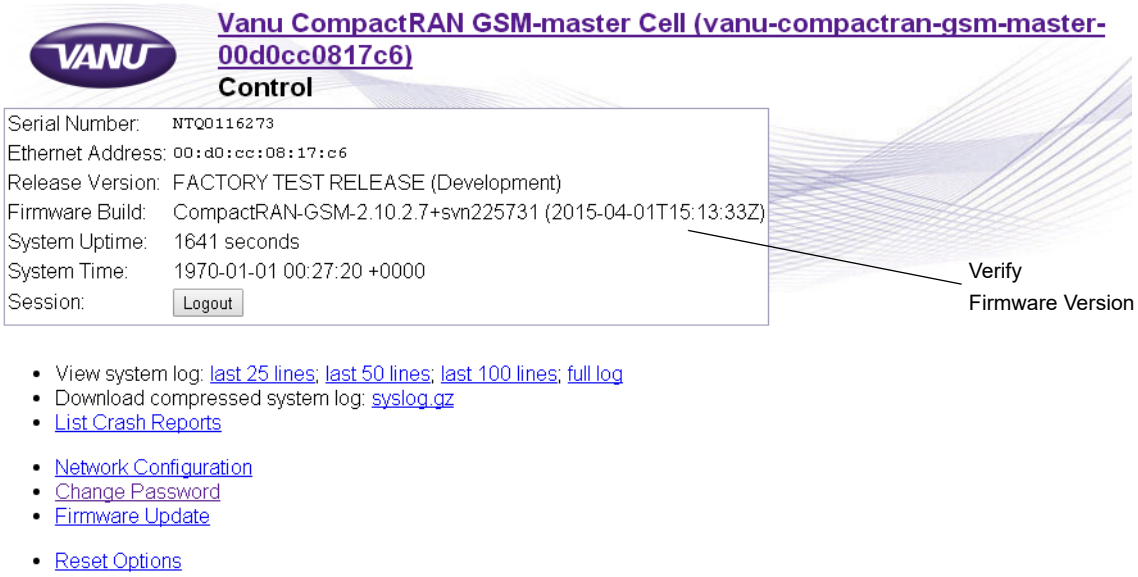
1. Start the CompactRAN Configure Cell tool.

   Refer to Setting Up the CompactRAN.

2. Select the **CompactRAN** you want to verify (Figure 3-5).
3. Click **Open Cell Control Page** The Verify Firmware Version screen displays. (Figure 5-1).

Figure 5-1. Verifying Firmware Version



DISPOSING OF EQUIPMENT

When disposing of the equipment, the CompactRAN CDMA/GSM base station should not be disposed of along with household waste at the end of life of the product. It should be handed over to the appropriate collection point for recycling of electrical and electronic equipment. For more detailed information about recycling, contact your local or regional waste administration.