TSB-Cradlepoint-IBR-650

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Description: Cradlepoint IBR650E embedded 3G modem router for kiosk use

The Cradlepoint IBR650 is the newest and future connectivity option for our kiosks, starting in Q2, 2013. It is available as both a Verizon kit (RBDX01177) and a Sprint kit (RBDX01178). These kits are made up of 3 parts that include a router, power supply and barrel adapter (all three pieces). The IBR650 offers and is configured for:

- Better connectivity performance.
    - o Commercial quality construction designed from the start for 24/7 operations.
    - o High performance Sierra wireless 3G internal modem.
    - o Dual antenna option if desired with dual ethernet port options.
- Improved management and administration options.
- Custom Redbox firmware with persistent options even through a hard reset.

Individual Redbox part numbers, if needed, are:

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IBR650 router - Verizon	IBR650 router- Sprint	IBR650 power supply	Antenna barrel adapter
RDBX01130	RDBX01131	RDBX01132	RDBX01133

Field Ops should be ordering the kit items: **Verizon=RDBX01177; Sprint=RDBX01178**. Unless only a separate power supply or replacement antenna adapter is needed.

1. Hardware Overview - Introduction

Antenna side view
1. Primary antenna port. (Shown with adapter attached.)
2. Power Switch (I/O)
3. Power LED
4. Alert LED
5. Modem LED
6. Signal Strength LEDs
7. Secondary antenna port (no adapter present)

8. ESN HEX label with added-on visual carrier designation. (Info also on bottom label)

    a. V = Verizon (IBR650E-VZ)

    b. S = Sprint (IBR650E-SP)

Ethernet side view
1. Power connector
2. Reset button
3. Ethernet Ports.

    a. Both configured the same, regardless of icon, use either one.

4. Micro USB

Power supply
12v/1.5A DC. 6’ cord.

The plug is a 4 prong, clip-in style that utilizes a pinch release clip that holds the plug in place. You must pinch it if you wish to remove it.

You must use this power supply for the IBR650 as the plug is specific to this router and will not fit into any other previous router.

The plug is an inline vertical style so as to not
interfere with VMZ drop bin removal.

2. Hardware Details - ports, buttons, switches

Power supply port: 4-pin connection from power supply

Reset: The Reset button is your first, best hardware troubleshooting step for issues. To initiate a system reset, press and hold for 15 seconds. Refer to section 5 – Troubleshooting, for more details.

Ethernet Ports: Regardless of the picture below them, our pre-loaded Redbox firmware has both Ethernet ports configured identically. Both are available LAN ports and you may use either one. By default, the Ethernet ports are configured to use DHCP (Dynamic Host Configuration Protocol) for local devices to connect to the router.

Because it uses DHCP, it is IMPARATIVE that your kiosk PC be configured to also use this protocol. Please see section 3 – Settings and Setup, for detailed information.

Ethernet lights:

- Light(s) ON = Ethernet connected
- Blinking light(s) = Data passing
- Green light/Yellow light = Type of connection (10/100/1000)

    - The actual color of the lights only indicate the speed of the connection and even at the lowest speed, it will not impact 3G wireless performance. We just care that a light is on, but typically we see both a green light and a yellow light lit (100mb speed)

- No light = Ethernet disconnected or link failure. See Section 5 – Troubleshooting.

Micro USB Port: Not currently used for Redbox as it requires a micro USB adapter, but possibilities exist for its use for firmware updates, alternative modem connections, etc. Redbox firmware updates will be managed either via manual upload or OTA (Over-The-Air). More details in Section 4 – Firmware and PRL updates.

• **Primary Antenna Port**: This should be used as the default connection for the 3G antenna. It is located to the left of the power switch.
• **GPS Antenna Port**: Located to the right ofthe signal bars. This is reserved for future use.
• **On/Off Switch:** A standard power switch.
I = ON / O = OFF
Power Light: indicates if the unit has power.
• Blue = Router On
• No light = Router Off

Alert Light: Per Cradlepoint, this is "Reserved for future use." Cradlepoint has not designated or acknowledged a specific use or any other signifigant light sequence for it at this time. That said, during testing we noted this light will flash amber upon router power cycle or when it detects a router reset. Also, it will light up as solid green during a firmware update while the modem light blinks green. There may also be other lights as noted below. During normal operation, this light is off.

Modem Light: Indicates status of modem connection according to the following lights.
• Solid Green = Active data connection
• Blinking green = Attempting modem connection OR Updating router firmware
• Solid Amber = Connection not available
• Blinking Amber = Cellular data connection error OR Router reset detected
• No light = Modem off
Additional LED indications:
• Factory reset button detected:

    o Alert light and modem status blink AMBER twice

• Error during USB firmware upgrade:

    o Alert light and modem status blink RED

Modem Signal Bars: These bars are one indicator of the modem signal strength. Ideally we look for 2 bars or better for reliable communications, but in some areas, even 1 bar is sufficient to sustain Redbox kiosks. For further information, see section 5 – Troubleshooting.

3. Settings and Setup

A. Mounting bracket

If there is an aluminum mounting bracket included with the IBR650, it is not necessary to install this bracket. It is optional and if not used it can be recycled. The IBR650 unit is small enough to rest right in the upper cross member where our Comms devices normally sit. The presence of this bracket may be discontinued in the future.

B. Kiosk PC setup

This unit takes advantage of DHCP. Our kiosks' PCs must also be configured properly. If you are not familiar with changing kiosk network settings, you can follow these instructions:

1. Log into the kiosk Redbox desktop, click on NETWORK SETTINGS.
2. RIGHT click the Local Area Connection, select the Properties menu.
3. DOUBLE click Internet Protocol (TCP/IP)
4. Make sure on the General tab that:

    a. “Obtain an IP address automatically” is the chosen option

    b. “Obtain DNS server address automatically” is the chosen option.

    c. It should look like the screen to the left.

5. Once done, click on the OK buttons till the windows are closed out.
6. Continue with the router installation, the kiosk PC is ready to go.

Installation of the router after the step above is straight forward. There are only three connections to make; Antenna, Power and Ethernet cable. All of these connections either clip-in or screw together and all should feel solid. Be sure to route cables away and secure them so the operation of the kiosk does not pose a threat to the wiring of the Comms unit. Power the unit on and it should start up and automatically connect. If it is the first time the unit has started, or after hardware reset,it may take the unit a few minutes to connect, be patient. Most routers connect in less than 5 minutes. If this time is exceeded, recheck your connections and make sure you have signal.

Be sure to email any kiosk Comms changes/updates to the Comms team: Comms@redbox.com. At a minimum, please include the carrier, router type, ESN and MAC address in the email.

C. Redbox Install checklist:

For kiosk installs, once the unit is online and connected, if you need to complete a Redbox install checklist, follow these steps:

Comms section:

- Comms Type: Wireless
- Wireless provider: Complete as normal. (Sprint or Verizon)
- Air Card Model: Cradlepoint Internal
- ESN DEC: Complete as normal. (This is an 11 digit number typically starting with 096).
    - o If there is any discrepancy between the Cell Kit ID sticker, the box and/or the actual unit, use the number located on the back of the actual unit.
- ESN HEX: this field will auto complete once the ESN DEC field is completed properly.
    - o Alternately, you can complete the ESN HEX field and let the ESN DEC field autocomplete itself.
- IMEI: (Not used).
- Wireless Router Type: Cradlepoint IBR650E
    - o There are three types of IBR routers, be sure to choose the correct one.
- Router Serial Number: Use the Router MAC address
    - o This should start with “003044…”
- Cell Kit ID: Complete as normal with the kit ID from the Cell Kit ID sticker.

D. Router interface/software access:

Using a browser, we can log into the router to accomplish several tasks, if needed or desired. To do so, with the router connected to the kiosk PC, start a secure browser session. On the address line, enter the IP address: 192.168.0.1. Press enter and the router login page should appear.

• Should any popup or other warning appear, close it and continue on.
• If you see only a blank red and gray page, the kiosk PC needs a software update. Contact MS to open a ticket for Software Support, they can update the kiosk PC browser.
• If it does not connect and returns any other error, then a problem exists elsewhere. Review your connections/setup and verify the PC is communicating to the router.

Once at the login screen, the router will ask for a username and password, they are available from Machine Support, if needed. They are not included here at Redbox Engineering's request.

The first time one gains access to the router software, the Getting Started/First Time Setup Wizard page may appear. We want to skip this page, making no changes. Please click on the Cradlepoint logo in the upper left corner and the Status/Dashboard screen will appear. From this page alone several details can be seen including router and modem information, connection status and signal strength. Once you are into the router software, some of the things you can accomplish include firmware updates, modem PRL updates, viewing system logs and more. Information on completing some of these tasks will be in the sections to follow. If any unwanted changes are made they can easily be undone and the router reset to defaults, maintaining all Redbox default settings, by completing a router reset, see section 5 – Troubleshooting for details.

4. Firmware and PRL updates

At the initial release, the firmware installed in all IBR650 units will be 4.2.2. This firmware is a Redbox only release and is not available anywhere else, except from Redbox. If a firmware upgrade is needed, only a Redbox approved firmware should be applied. These will be approved and the version numbers communicated and released by the Comms team. The files, if necessary, will be available as part of the Field's thumb drive folder or if possible, via Fieldhouse.

Changing firmware:

A. OTA (Over-The-Air) method:
This is the preferred method for firmware updates.

1. Log into router using the directions in Section 3D (Router interface/Software access).

2. On the top menu, navigate to: System Settings > System Software

3. CHECK THE FACTORY RESET BOX (ON) – this is important.

4. Confirm the "Available Firmware Version" is the version you wish to upgrade to.

- At initial release, IBR650 routers used firmware 4.2.2.

- If the newly communicated version shows different – DO NOT continue with the upgrade, please contact the Comms team.

5. Click on the "Automatic (Internet)" update button.

To confirm the process has started, be sure the alert light is solid green and the modem light blinking green. At this point, the router will continue an OTA update on its own. You MUST keep the router on and connected. The router will stay online and will download the firmware in the background. Once the entire firmware is downloaded, then the router goes offline and applies the update. It should come back up a few minutes later. Whole process takes about 5 to sometimes 30+ minutes as it greatly depends on the download connection speed. Once it gets the file it needs, though, the router is only offline for about 5 minutes while it applies the update and reboots itself.

B. Manual method:
Can be used if the update file is in your possession or if poor download speeds prohibit OTA updates from completing.
1. Follow steps 1-3 above.
2. Click Manual Firmware Upload (a window will open)
3. Click choose file and browse to the file location.

- If the file is on your USB drive, make sure the USB drive is inserted into the PC.

4. After the file is selected, click on Begin Firmware update.

With manual update, keep the browser window open as it is facilitating the file transfer. This method is faster, as everything is local. The router will go offline and

reboot and install new Redbox firmware. Afterwards, it should reconnect. It takes about 5 minutes beginning to end.

C. USB method:

Though possible, this method will not be available to the field. The required adapter is not an available part for the field. This method will be reserved for the Comms team. The preferred OTA and the manual method are sufficient alternatives to USB updates for field operations.

Updating embedded modem PRL:

What is a PRL? The Preferred Roaming List (PRL) - used by 3G CDMA modems, is a binary file that is downloaded and resides in all dual and tri-mode CDMA devices that displays coverage information via the Enhanced Roaming Indicator (ERI). The PRL ultimately ensures a device connects to the appropriate carrier in any particular area or location. (4G devices and other devices that use SIM cards do not generally use PRLs)

The internal Cradlepoint modem can be updated using the router software interface. Comms recommends completing this simple process during all preventative maintenance kiosk visits, or as part of troubleshooting Comms issues with the unit.

D. Checking the PRL:

1. Once logged into the router software, click on “Internet Connections” located in the black bar at the very top of the screen.
2. For the IBR650E, the device list should only display one item “Modem: Internal EVDO”
3. Scroll down the Property list to find “PRL Version”
4. Across from that on the Value field is the reported PRL number.

    • For all IBR650E-SP (Sprint) units, the value should be 64100. This should never need to changed or be updated. If your Sprint unit shows a different value, attempt two PRL updates. If it does not change to 64100, replace the unit and contact Comms@outerwall.com with the ESN of the unit.

• For all IBR650E-VZ (Verizon) units, the values vary and will need occasional updates. Doing so as part of preventative maintenance will help improve your Comms in the long run. Per Verizon, "The way that Verizon Wireless has implemented PRL's, is an incremental number that will continue to increase. At the moment, it is a 5 character value that begins with the number 5. Although this may change in the future."

o The Verizon PRL at the time of this writing is 53236. It should only increase going forward at this time.

E. Updating the PRL:

1. Once logged into the router software, click on the Green dot right next to "Internet Connections" (step 1 above). If it is not green, PRL updates will not work. The router must be connected and online.
2. You will be taken to the Internet/Connection Manger screen.
3. Click directly on the name "Modem:Internal EVDO" listed there.
4. After you have selected the modem, the Control button above it should be available to select.

• If the button is still grayed out, press F5 to refresh the screen and select the modem again.

5. Click the Control button; this will open the Update/Activate Device window.
6. Click the Activate button.

• This will take the modem offline. The process will attempt to update the PRL, when it is complete the modem will reconnect on its own. This takes about 1-3 minutes.

• After complete, you can recheck the PRL using the aforementioned "Checking the PRL" process to see if the PRL value changes.

5. Troubleshooting

While Redbox and Cradlepoint are confident that the IBR650 units will perform as good as or better than previous wireless communication solutions, there are many factors that affect performance and some unexpected problems may arise. To

overcome those challenges field techs should be versed at troubleshooting and solving problems on site. Within this section we will cover some of the basics and advanced steps in resolving communication issues. It is not all inclusive and beyond these steps, there is always assistance from Machine Support to help with resolving communication issues.

A. Router Reset:
Router resets will be one of the best ways of getting your Comms back to square one and resolving most all wireless hic-ups that may be router/modem related. You will need a paperclip or another similar object like a very small screwdriver (for adjusting picker sensors). A typical pen will not work as it is too big and will not press the reset button. If you don't hear a click (it's quiet, but listen for it), you did not get the button to depress.
1. With a paper clip or other small device, press and hold the reset button (listen for the click).
2. The antenna lights will flash through a count of 10 seconds.
3. Watch the Alert and Modem light, they will flash orange twice. Afterwards, you can release the reset button. This takes about 15 seconds, total.

B. Power and Ethernet connectivity issues
Once these units are placed there is little more than just power, ethernet and antenna. Power troubleshooting is self-evident, either you have it or you don't. Otherwise the power adapter may be suspect and you can order these separately if needed. It was mentioned earlier, but again for your convenience: Part# RDBX01132).

Finally, there is the Ethernet connection. First, and foremost, make sure your PC is configured as noted in section 3A: Kiosk PC Setup. That is the starting point. Once it is confirmed that it is setup properly, plug the ethernet cable into the router. If the router is on and has booted (on for about 60 seconds), an ethernet light should illuminate on the router's ethernet port. Additionally, if visible, there may also be a light on the ethernet port on the kiosk PC. If it does not light, try the second port. If it does not light up, there is probably either a configuration issue with the PC, a bad ethernet cable or a problem with the router. The router may not have booted up fully yet, give it a few minutes in case it was processing some update or upgrade. If you continue to have issues and fail to achieve ethernet connectivity and you have reviewed all the information above, try the connectivity of your laptop with the router. You laptop is probably setup for DHCP already, so plug it into the router to see if you achieve connectivity. If this succeeds, there may be an issue with your

kiosk PC or your kiosk PC's ethernet port. If all attempts fail, call MS for additional assistance. They may ask you to go over the PC IP configuration again, but it is all part of the process.

C. Signal Strength and Antennas

Another key piece to good wireless communications is, of course, the signal. If there is no signal, there will be no communications. If the signal is greatly degraded, the communications will also act accordingly. Once that kiosk door is closed, almost all (if not all) RF energy is blocked and any signal that is received inside the kiosk is most likely one that has been reflected several times over and is greatly degraded. It is important that our antennas be external to the kiosk that our antenna cables are in good condition and our connections solid. Periodic review of your antennas during routine PMs is a great way to make sure your wireless connection will stay solid and dependable.

Looking at just the signal strength indicator on the router is only one way of determining signal strength. It gives no indication of the quality of the signal, nor does it give the actual dB value of the signal strength. To find more information, one can log into the router and pull data, if desired.

1. Log into the router using the steps detailed in section 3C - Router interface/software access.
2. Once logged into the router interface, navigate through the menus to:

    i. STATUS / INTERNET CONNECTIONS

    (Or, click on the "Internet Connections" in the black bar at the top.)

3. There you will find a list of Properties and corresponding Values.

    i. Find "Signal Strength". Ideally we are looking for -90 dBm or better. Values as low as -97 dBm or poorer may work.

    ii. Find "Ec/Io". Ideally we are looking for a value greater than -2, values of -5 dBm or higher will suffice.

• Poor values for these two properties may be an indication that there is some type of antenna or coverage issue. Double check your connections. Possibly add a booster. If you are not using the immobile “secure antenna,” some antenna placement adjustments may be need. Otherwise, contact MS about troubleshooting or for further Comms assistance.

iii. Regardless of the values above, the primary goal is that the unit is connected and passing data traffic. The Comms team has noted and tested higher values then the ones given here and still maintained an active, valid connection. If you feel improvements need to be made, reach out to MS for troubleshooting. If they feel Comms needs to be involved, they will escalate the issue to us and we will review it on and one-by-one basis.

D. RMAs / Ordering Additional Units

NOTE: If the steps herein did not fix the issue and you believe you have a defective or faulty unit that needs returned; Please do NOT write on, cross out or inhibit the effectiveness of any barcode or label. Do not write “bad” or “broken” or in any other way deface, mar, or mark the surface of the router. Acceptable means of tagging routers are to either use the provided and proper tags attached via the included twist wire on the antenna adapter or a piece of masking tape (as it is easily removable). Both of which can be written on in lieu of writing on the router itself. Please do not use packing tape, as it can mar the surface in addition to being difficult to remove. If you have used Velcro on the router, please remove it before sending it back to Parts.

If you need a replacement or more IBR650s, or if you do find that you have a unit that needs to be returned, your ROS can order more IBR650 units. To return your unit, please include it with any shipment headed back to Parts. If you have an RMA associated with it, include that # on the tag or masking tape attached to the router.

To order additional IBR650s, ROSs will need to make use of the spare parts web ordering form here:
https://collab.outerwall.com/sites/RBOps/FormsTemplates/Spare%20Part%20and%20Cleaning%20S upply%20Request%20Form.htm

Should this procedure change, the field will be made aware of those changes. At this time, previous typical RMA procedures are not in place or working for the IBR650s. They must be ordered by the ROSs

E. Review

Troubleshooting kiosk communications starts with a good PM. Periodic updates of the units PRLs, maintaining the antenna integrity and getting a good signal. Additional assistance can be found with Machine Support. They are your next source of assistance in troubleshooting. Further help, if necessary will be managed by them. If the Comms team needs to be involved, MS will reach out to the Comms team after they have documented the issues that are occurring and exhausted the troubleshooting knowledge and techniques available to them.

Tools/Parts Needed:

Cradlepoint IBR650 embedded modem router.

Verizon kit: RDBX01177

Sprint kit: RDBX01178

Individual items:

IBR650E-VZ router: RDBX01130 (part number for inventory only)

IBR650E-SP router: RDBX01131 (part number for inventory only)

IBR650 power supply: RDBX01132 (available for individual ordering)

IBR650 Coax adapter: RDBX01133 (available for individual ordering)

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