



CHAPTER 6

Troubleshooting

This chapter provides troubleshooting information for the Cisco uBR7200 series universal broadband router and contains the following sections:

- [Problem Solving with Subsystems, page 6-2](#)
- [Power Subsystem, page 6-5](#)
- [Cooling Subsystem, page 6-5](#)
- [Processor Subsystem, page 6-6](#)
- [About Verifying the Downstream Signal, page 6-10](#)

Overview

This chapter contains instructions to help installers and technicians troubleshoot hardware installation.

[Figure 6-1](#) shows the general troubleshooting strategy used to troubleshoot the hardware. Refer to this flow chart as necessary and follow the steps to isolate hardware problems to a specific subsystem.

For cable-specific commands for Cisco uBR7200 series universal broadband routers, refer to the *Cisco IOS CMTS Cable Command Reference Guide* at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

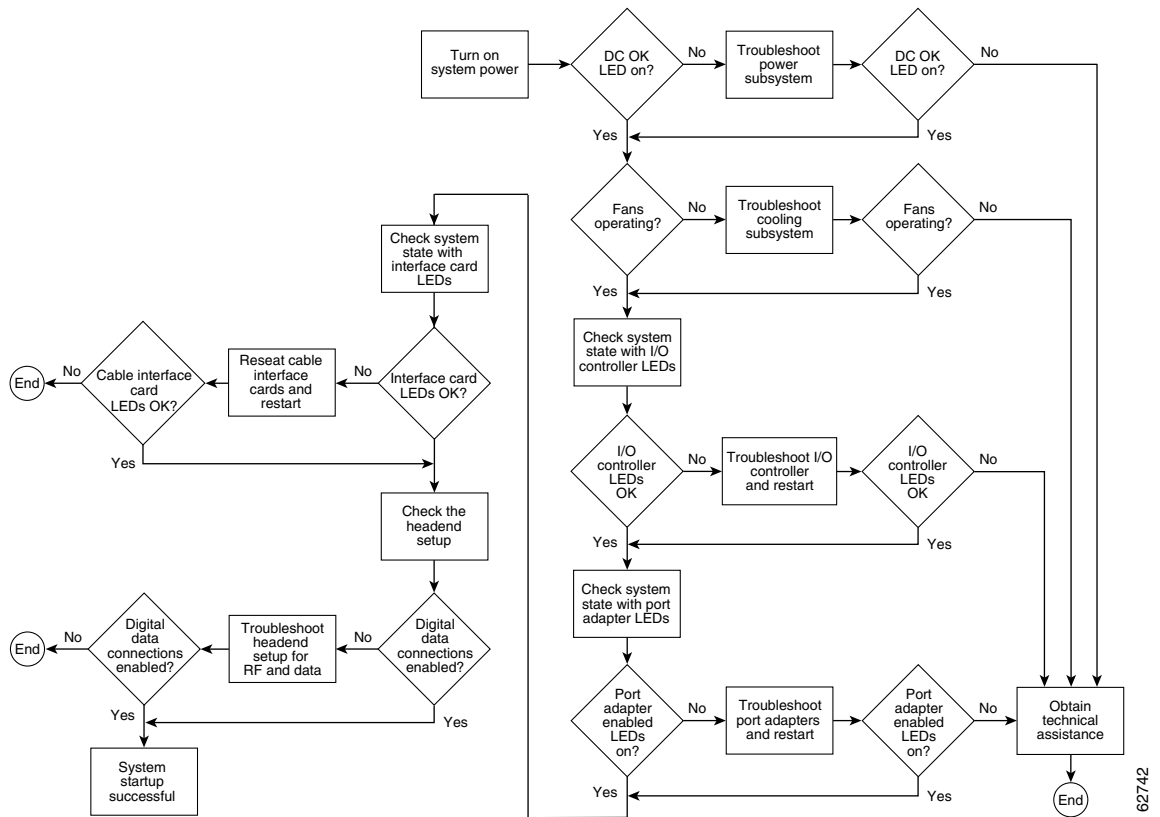
Resolve the problem if possible or contact the Cisco Technical Assistance Center.

Providing Information

If you are contacting Cisco TAC or your customer service representative, provide the following information:

- Date you received your Cisco uBR7200 series universal broadband router
- Chassis serial number
- Type of software and release number
- Brief description of the problem you are having
- Brief explanation of the steps you have taken to isolate and resolve the problem
- Maintenance agreement or warranty information

Figure 6-1 Troubleshooting Strategy for Startup Problems



Problem Solving with Subsystems



Tip

Isolating a problem to a specific subsystem simplifies the troubleshooting process.

The first step in isolating a problem is to compare what the system *is doing* to what it *should be doing*. Usually a startup problem is caused by a single component, so first isolating the problem to a subsystem rather than troubleshooting every component in the entire system is more efficient. The Cisco uBR7200 series router subsystems are listed below.

- Power subsystem—Includes the power supplies, the external power cable, and the midplane.
- Cooling subsystem—The chassis fan tray is the single component in this subsystem. The fans should be operating whenever system power is on. Replace the fan tray if you determine that a fan is not functioning properly.
- Processor subsystem—Includes the I/O controller, network processing engine, all port adapters, the cable clock card, and cable interface line cards.

The system memory and management functions reside on the I/O controller and the network processing engine. The enabled LED on each port adapter or cable interface line card indicates if the port adapter or cable interface line card is initialized.

**Caution**

A port adapter or cable interface line card that is partially installed in the midplane can cause the system to hang and crash.

- Cable headend subsystem—External to the Cisco uBR7200 series router, this subsystem can prevent operation of the universal broadband router if the headend is not properly set up for the introduction of digital data into the hybrid fiber-coaxial (HFC) network.

The following section helps you isolate a problem to one of the subsystems and directs you to the appropriate troubleshooting section.

Identifying Startup Problems

When you start up the Cisco uBR7200 series router for the first time, observe the startup sequence described in the [“Powering On the Cisco uBR7200 Series Router”](#) section on page 3-24. This section contains a detailed description of the normal startup sequence.

Although an overtemperature condition is unlikely at initial startup, the environmental monitoring functions are included in this chapter because they also monitor internal voltages.

Startup problems are commonly caused by source power problems or a board (network processing engine, I/O controller, port adapter, or cable interface line card) that is not properly connected to the midplane. Always check that your boards are properly installed in the chassis.

With the exception of the fan tray and network processing engine, LEDs indicate all system states in the startup sequence. By checking the state of the LEDs, you can determine when and where the system failed in the startup sequence.

**Note**

On rare occasions, an LED may be faulty.

Use the following descriptions to isolate the problem to a subsystem, then proceed to the appropriate sections to try to resolve the problem. When you start up the system, by turning on the power supply switch, the following should occur:

1. You should immediately hear the fans operating. If not, proceed to the [“Cooling Subsystem”](#) section on page 6-5. If you determine that the power supply is functioning normally and that a fan is faulty, contact a customer service representative. If a fan does not function properly at initial startup, there are no installation adjustments that you should make.
2. The power supply’s green power OK LED (at the rear of the chassis) should go on immediately when you place the power supply switch in the ON (I) position, and should remain on during normal system operation. If the green power OK LED *does not* go on, proceed to the [“Power Subsystem”](#) section on page 6-5.
3. The LEDs on the I/O controller should go on as follows:
 - a. The I/O power OK LED comes on immediately and indicates that the I/O controller is receiving DC power from the Cisco uBR7200 series router midplane. This LED comes on during a successful boot and remains on during normal operation of the router.

If this LED remains off when starting the router, either there is a problem with the power supply (it is damaged or not connected to the Cisco uBR7200 series router midplane), or the network processing engine (NPE) or the I/O controller is not connected to the midplane. Proceed to the [“Troubleshooting the I/O Controller”](#) section on page 6-6.

- b. The enabled LED comes on after the I/O power OK LED and indicates that the network processing engine and the I/O controller are enabled for operation by the system; however, it does not mean that the Fast Ethernet port on the I/O controller is functional or enabled. This LED goes on during a successful boot and remains on during normal operation of the Cisco uBR7200 series router.

If this LED remains off when you start the router, it is probably a problem with the network processing engine or the I/O controller (they are damaged or not connected to the Cisco uBR7200 series router midplane), or the Fast Ethernet port is in shutdown mode. Refer to the [“Troubleshooting the I/O Controller”](#) section on page 6-6 and the [“Troubleshooting the Network Processing Engine”](#) section on page 6-7.

- c. The FE enabled LED comes on after the enabled LED and indicates that the Fast Ethernet port on the I/O controller is initialized and enabled for operation by the system. This LED comes on during a successful boot and remains on during normal operation of the Cisco uBR7200 series router.

If this LED remains off when starting the router, it is probably a problem with the Fast Ethernet port on the I/O controller. Refer to the [“Troubleshooting the I/O Controller”](#) section on page 6-6.

- d. The FE link LED comes on only when the Fast Ethernet port on the I/O controller is receiving a carrier signal from the network. This LED remains off during normal operation of the router unless there is an incoming carrier signal, and does not indicate startup problems.
 - e. The slot 1 and slot 2 LEDs come on after the enabled LED and indicate which Personal Computer Memory Card International Association (PCMCIA) slot is in use. During a successful boot, these LEDs come on and remain on if a flash memory card is present in the slot. These LEDs also blink when either slot is being accessed by the system. These LEDs do not indicate startup problems.
4. The enabled LED on each port adapter comes on when the network processing engine completes its initialization of the port adapter for operation. The enabled LED indicates that the port adapter is receiving power and has been recognized by the network processing engine; it does not indicate the state of the individual interfaces on the port adapters. If an enabled LED fails to come on, refer to the [“Troubleshooting Port Adapters”](#) section on page 6-8.
 5. The enabled LED on the cable clock card (Cisco uBR7246VXR only) comes on when the network processing engine completes its initialization of the cable clock card for operation. The enable LED indicates that the cable clock card is receiving power and has been recognized by the network processing engine; it does not indicate the state of the primary or secondary interfaces on the cable clock card. If the enable LED fails to go on, refer to the [“Troubleshooting the Cisco Cable Clock Card \(Cisco uBR7246VXR Only\)”](#) section on page 6-8.
 6. The enabled LED on each cable interface line card comes on when the network processing engine completes its initialization of the card for operation. The enabled LED indicates that the card is receiving power and has been recognized by the network processing engine; it does not indicate the state of the individual interfaces on the card. If an enabled LED fails to come on, refer to the [“Troubleshooting Cable Interface Line Cards”](#) section on page 6-9.
 7. When all LEDs come on to indicate that the system has booted successfully, the initial system banner should appear on the console screen. If it is not displayed, refer to the [“Console and Auxiliary Port Connection Equipment”](#) section on page 3-15 to verify that the terminal is set correctly and that it is properly connected to the I/O controller’s console port.

Power Subsystem

Check the following to help isolate a problem with the power subsystem:

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- Step 1** Toggle the power supply switch off and on.
 - Step 2** On the first power supply, is the power OK LED on?
 - a. If yes, the power source is good, and the power supply is functional.
 - b. If not, make sure that the power cable is connected at both ends. Then toggle the power switch Off and On.
 - Step 3** If the power OK LED remains off, and the power switch is on, suspect the power source or the power cable.
 - a. Turn the switch off, and connect the power cable to another power source, if available.
 - b. Turn the switch back on.
 - c. If the LED comes on, the problem is the first power source.
 - Step 4** If the power OK LED fails to come on after you connect the power supply to a new power source,
 - a. Turn the power switch off.
 - b. Replace the power cord.
 - c. Turn the switch back on.
 - Step 5** If the power OK LED comes on, return the first power cable for replacement. Contact a service representative for further instructions.
 - Step 6** If the LED still fails to come on when the power supply is connected to a different power source with a new power cable, the power supply is probably faulty.
 - a. If a second power supply is available, and your Cisco uBR7200 series router has a redundant power supply bay, install the second power supply in the second bay if there is no power supply installed in that bay.
 - b. Contact a service representative for further instructions.
 - Step 7** Is the power OK LED on for the second (redundant) power supply?
 - a. If yes, proceed to the [“Cooling Subsystem” section on page 6-5](#).
 - b. If not, repeat each of the above procedures for the second power supply.
 - Step 8** If you are unable to resolve the problem or if you determine that either a power supply or chassis connector is faulty, contact a service representative for instructions.
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Cooling Subsystem

Check the following to help isolate a problem with the cooling system:

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- Step 1** Verify that the fans are operating when you start up the system.

To determine if the fans are operating, listen for them. In noisy environments, place your hand on the left side of the chassis (when viewing the chassis from the front) to feel for air being forced out the vents.

- a. If yes, the power to the fan tray is good.
- b. If no, there is a problem with the fan tray or power. See the [“Power Subsystem” section on page 6-5](#).

Step 2 Verify that the following message is not displayed.

```
Queued messages:
%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
```

If the message is displayed, the system has detected an overtemperature condition or power out-of-tolerance condition inside the chassis.

The shutdown message could also indicate a faulty component or temperature sensor. Before the system shuts down, use the **show environment** or **show environment table** command to display the internal chassis environment.

If an environmental shutdown results from a power out-of-tolerance condition, the power OK LED goes off and the system shuts down. See the [“Power Subsystem” section on page 6-5](#).

Step 3 Although an overtemperature condition is unlikely at initial startup, ensure that heated exhaust air from other equipment is not entering the inlet vent on the router and that there is sufficient clearance around the sides of the chassis to allow cooling air to flow. Refer to the [“Site Environment” section on page 2-6](#) and the [“Equipment Racks” section on page 2-17](#) for preventive site configurations.

Processor Subsystem

The processor subsystem is comprised of the I/O controller, the network processing engine, all port adapters, the clock card (Cisco uBR7246VXR), and all cable interface cards. The I/O controller and network processing engine are required system components. The system cannot operate unless the I/O controller and network processing engine are installed properly; however, the system can operate without any port adapters or cable interface cards installed.

If a port adapter or cable interface card is partially connected to the midplane, the card sends connection incomplete signals to the processor, which then faults the peripheral component interconnect (PCI) bus and causes the system to hang.

Therefore, first ensure that the I/O controller and the network processing engine are installed properly and the system software has initialized successfully. Then, if necessary, you can troubleshoot individual port adapters, the cable clock card (Cisco uBR7246VXR only), and the cable interface cards.

Troubleshooting the I/O Controller

Check the following items to help isolate the problem.

- Step 1** Verify that the I/O controller LEDs come on when the system power switch is turned on.
 - a. If the LEDs stay off, first refer to the [“Power Subsystem” section on page 6-5](#) and the [“Cooling Subsystem” section on page 6-5](#) to ensure that both the fans and the power supply are functioning properly.
- Step 2** If the power supply and fans appear operational but none of the I/O controller LEDs are on, check to see if an improperly connected I/O controller or port adapter has hung the system.

**Note**

If you are reseating only the port adapters, you do not need to turn the power off.

- a. With the power supply turned off, reseat the I/O controller and port adapters in their slots.
- b. Tighten all captive installation screws to make sure that the cards are securely seated.
- c. Restart the system.

Step 3 Verify the I/O controller enabled LED is on.

- a. If yes, the system software has initialized successfully, and the system is operational.
- b. If no, refer to the “[Troubleshooting the Network Processing Engine](#)” section on page 6-7.

Step 4 If the enabled LED remains off after troubleshooting the NPE, the system detected a processor hardware failure. This LED should be on in normal operation. Contact Cisco TAC for instructions.

Troubleshooting the Network Processing Engine

Check the following to help isolate a problem with the network processing engine (NPE):

Step 1 If the I/O controller enabled LED does not go on as expected:

- a. Turn off the power to the router.
- b. Reseat the network processing engine in its slot.
- c. Restart the router.

Step 2 Verify that you are running a version of Cisco IOS software that supports the NPE you are using:

- a. For the latest Cisco IOS software release information, refer to the Cisco uBR7200 series release notes at the following URL:

http://www.cisco.com/en/US/products/hw/cable/ps2217/prod_release_notes_list.html

- b. Use the **show version** command to determine the NPE that is installed in your router.
- c. If the router does not respond to the console input, contact Cisco TAC for instructions.

Step 3 If the enabled LED remains off, the system detected a processor hardware failure. This LED should be on in normal operation. Contact Cisco TAC for instructions.

Troubleshooting Port Adapters

Check the following to help isolate a problem with the port adapters:

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- Step 1** Verify that *all* port adapter enabled LEDs are on.
- If yes, the port adapter is operational.
- Step 2** Check to see if *any* port adapter enabled LEDs are off.
- If the enabled LED on an individual port adapter is off, suspect that the port adapter has pulled away from the midplane.
 - Reseat the port adapter in its slot. (You do not have to turn off the system power when removing or replacing port adapters.) After the system reinitializes the interfaces, the enabled LED on the port adapter should come on.
- Step 3** If the port adapter enabled LED remains off, the system detected a processor hardware failure. This LED should be on in normal operation. Contact Cisco TAC for instructions.
- Step 4** Ensure that the hardware revision of the port adapter in question is supported by your particular Cisco uBR7200 series router chassis.
- Use the **show diag** command to determine the type of port adapter that is installed in your router.
 - Consult the port adapter support matrix in the *Cisco uBR7200 Series Software Configuration Guide* at the following URL:
<http://www.cisco.com/en/US/docs/cable/cmts/ubr7200/configuration/guide/cr72scg.html>
 - If the router does not respond to the console input, contact Cisco TAC for instructions.
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Troubleshooting the Cisco Cable Clock Card (Cisco uBR7246VXR Only)

Check the following to help isolate a problem with the clock card:

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- Step 1** Verify that the cable clock card enable LED is on.
- If yes, the cable clock card is operational.
- Step 2** Check to see if the cable clock card enable LED is off.
- If the enable LED on the cable clock card is off, suspect that the cable clock card has pulled away from the midplane.
 - Power off the router.
 - Reseat the cable clock card in its slot.
 - Power the router back on.
 - After the system reinitializes, the enable LED on the cable clock card should come on.
- Step 3** If the enable LED remains off, the system has detected a processor hardware failure. This LED should be on in normal operation. Contact Cisco TAC for instructions.
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Troubleshooting Cable Interface Line Cards

Check the following to help isolate a problem with the cable interface line cards:

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- Step 1** Verify that *all* cable interface card enabled LEDs are on.
- If yes, the system is operational.
- Step 2** Check to see if *all* cable interface card enabled LEDs are off.
- If yes, verify that you are running a version of Cisco IOS software that supports the cable interface cards you are using.

For the latest Cisco IOS software release information, refer to the Cisco uBR7200 series release notes, at the following URL:
http://www.cisco.com/en/US/products/hw/cable/ps2217/prod_release_notes_list.html

For the latest information on supported features, refer to the Cisco uBR7200 series software features guide at the following URL:
http://www.cisco.com/en/US/products/hw/cable/ps2217/products_feature_guides_list.html
 - If the Cisco IOS software is correct, contact Cisco TAC for instructions.
- Step 3** Check to see if *any* cable interface card enabled LEDs are off.
- If the enabled LED on an individual cable interface line card is off, check to see if the cable interface line card has pulled away from the midplane.
 - Reseat the cable interface line card in its slot. (You do not have to turn off the system power when removing or replacing cable interface line cards.)
 - After the system reinitializes the interfaces, the enabled LED on the cable interface line card should come on.
- Step 4** If the enabled LED remains off, the system detected a processor hardware failure. This LED should be on in normal operation. Contact Cisco TAC for instructions.
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Other Troubleshooting Information Websites

These websites are provided to help you find the most current troubleshooting information:

- Search the Cisco TAC assistance website, at the following URL:
<http://www.cisco.com/en/US/support/index.html>
- Search cable products field notices at the following URL:
http://www.cisco.com/en/US/support/tsd_products_field_notice_summary.html
- Find router and Cisco IOS architecture technical tips at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps341/prod_tech_notes_list.html
- If your system is still not responding, find help at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps359/products_tech_note09186a0080106fd7.shtml

About Verifying the Downstream Signal

If the Cable Modem Termination System (CMTS) has not been properly set up to support digital data, the Cisco uBR7200 series router might start up, but fail to support data transmission. You can use a router with diagnostic capabilities, such as the Cisco uBR900 series cable access routers, to verify the downstream signal originating from a Cisco uBR7200 series router. The Cisco uBR900 series cable access routers are equipped with 64- and 256-QAM receivers that require only minimal setup. Configure the Cisco uBR900 series routers according to DOCSIS practices.



Tip

A maximized signal-to-noise ratio (SNR) estimate optimizes cable interface reliability and service quality.



Note

The SNR estimate for a cable interface installed at the headend should be between 35 and 39 dB.

Before starting this procedure,

- Connect the Cisco uBR7200 series router to the console. See the “[Console and Auxiliary Port Connection Equipment](#)” section on page 3-15.
- Set up the console. See the *Cisco uBR7200 Series Software Configuration Guide* at the following URL:

<http://www.cisco.com/en/US/docs/cable/cmts/ubr7200/configuration/guide/cr72scg.html>

To verify the downstream signal originating from the Cisco uBR7200 series router:

Step 1

When the Cisco uBR900 series cable access router is operating and you have established an input signal of between -10 and $+10$ dBmV on the modem, enter the **show controllers cable-modem 0** command. This command displays:

- Signal-to-noise ratio (SNR)
- Downstream signal frequency
- Downstream signal modulation scheme (64 QAM or 256 QAM)

Example:

Router# **show controllers cable-modem 0**

```
Tuner:status=0x00
Rx:tuner_freq 555000000, symbol_rate 5055926, local_freq 1152000
    snr_estimate 352(TenthdB), ber_estimate 0, lock_threshold 26000
    QAM in lock, FEC in lock, qam_mode QAM_64
```

This shows a downstream frequency of 555 MHz, 64-QAM downstream, and an SNR estimate of 35.2dB.



Note

Use the **debug cable mac log verbose** and **show controllers cable 0 mac state** commands when troubleshooting the cable interface’s initialization sequence and locking on the downstream signal.

- Step 2** Scan the output for the value corresponding to the “SNR_estimate” variable. If this value is at least 35 dB, then you have an optimized signal. If the value is less than 34 dB, you must adjust the upconverter at the cable headend.
- Verify that the line card DS output level is correct (+32 dBmV or +42 dBmV, depending on model).
 - Make sure that the uBR7200 Series line card IF input to the upconverter is within an acceptable range (check the upconverter manufacturer's specifications).
 - Check the upconverter RF output level. A typical setting is +55 to +58 dBmV.
 - Make sure that the upconverter RF output center frequency has been set correctly.

**Note**

When using a GI C6U upconverter, the displayed frequency will be 1.75 MHz below the channel's actual center frequency.

- Make sure that the proper amount of attenuation has been installed between the upconverter RF output and headend combiner input so that the digitally modulated carrier's average power level is 6 dB to 10 dB below the level of the analog TV channels.
- Make sure that the digitally modulated carrier's RF average power level is in the -15 dBmV to +15 dBmV range at the input to the cable router.

**Note**

The exact value displayed will vary from cable interface to cable interface; however, the values collected from measurement to measurement on the same router will be consistent.

- Step 3** If the previous steps do not identify the problem, check the downstream digitally modulated carrier using a QAM analyzer. Several third-party test equipment manufacturers have these instruments available.
- Measure modulation error ratio (MER), which should be 35 dB or greater in the headend.
 - Check pre- and post-FEC bit error rate (BER). There should be no bit errors in the headend. If bit errors are observed, one likely cause is sweep transmitter interference.
 - Check the sweep transmitter to make sure that adequate guard bands have been programmed around the digitally modulated carrier.
 - Bit errors also may be caused by clipping of the digitally modulated carrier in the upconverter or other active device, including amplifiers and optical transmitters.
 - Evaluate the digitally modulated carrier's constellation. Look for evidence of:
 - Gain compression
 - Phase noise
 - I-Q (inphase and quadrature) imbalance
 - Coherent interference
 - Excessive noise
 - Clipping
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