HFC Plant Troubleshooting Guide

Overview

Introduction

Some of the faults that can develop in an HFC plant require careful analysis to correctly identify and resolve. Fault isolation may require visits not only to the customer residence, but also to one or more upstream locations in the network. Intermittent problems, with fault symptoms that come and go at random, can be especially difficult to pinpoint.

In these cases, it is very important to follow effective troubleshooting practice so that you narrow down the true cause of the problem, as this will help avoid customer callbacks and repeat truck rolls. When the solution involves returning equipment for service, it is also important to document your findings.

Purpose

This guide provides basic instructions for troubleshooting a HFC plant and documenting your findings for amplifier and node devices used in a HFC cable plant when there is a suspected intermittent operation.

Audience

The audience for this document are system operators and technicians working in hub or node environments.

Qualified Personnel

Only appropriately qualified and skilled service personnel should attempt to install, operate, maintain, and service this product.

WARNING:

Allow only qualified and skilled personnel to install, operate, maintain, and service this product. Otherwise, personal injury or equipment damage may occur.

Document Version

This is the first version of this document.

In This Document

Introduction

This guide divides the troubleshooting process into three sets of activities:

- Observation and measurement at the customer residence
- Observation and measurement at the upstream RF amplifier
- Observation and measurement at the upstream optical node

The next three sections describe these activities and provide troubleshooting flow diagrams to help track your progress. The final section of this document describes the procedure for returning suspected faulty equipment and completing a complaint input form.

Important: Before returning equipment for service, contact your local Cisco representative for a return materials authorization (RMA) number. Always include a completed complaint input form when returning product for repair.

At the Customer Residence

When you receive the trouble ticket, review the problem description provided by the customer. Note whether the problem is described as:

- Related to TV reception, Internet performance, or both
- If a service outage, whether partial or complete, and the area affected
- If interference, whether it is continuous or intermittent
- Unique to this customer, or part of a more general problem

These characteristics of the problem often help to pinpoint the cause and a likely solution.

Confirming the Problem

After reviewing the customer description, go to the customer residence and confirm the problem.

If the problem isn't obvious and you can't duplicate it, you may have no choice but to close out the ticket and ask the customer to call again if the problem reappears. In this case, it is important to gather as much information from the customer as possible on the circumstances surrounding the problem - time, temperature, and other environmental conditions - for reference in the event of a later occurrence.

Identifying Possible Suspect Devices

If you can confirm the problem, collect data plots for the downstream data path if related to TV service, or the upstream and downstream data paths if related to Internet service.

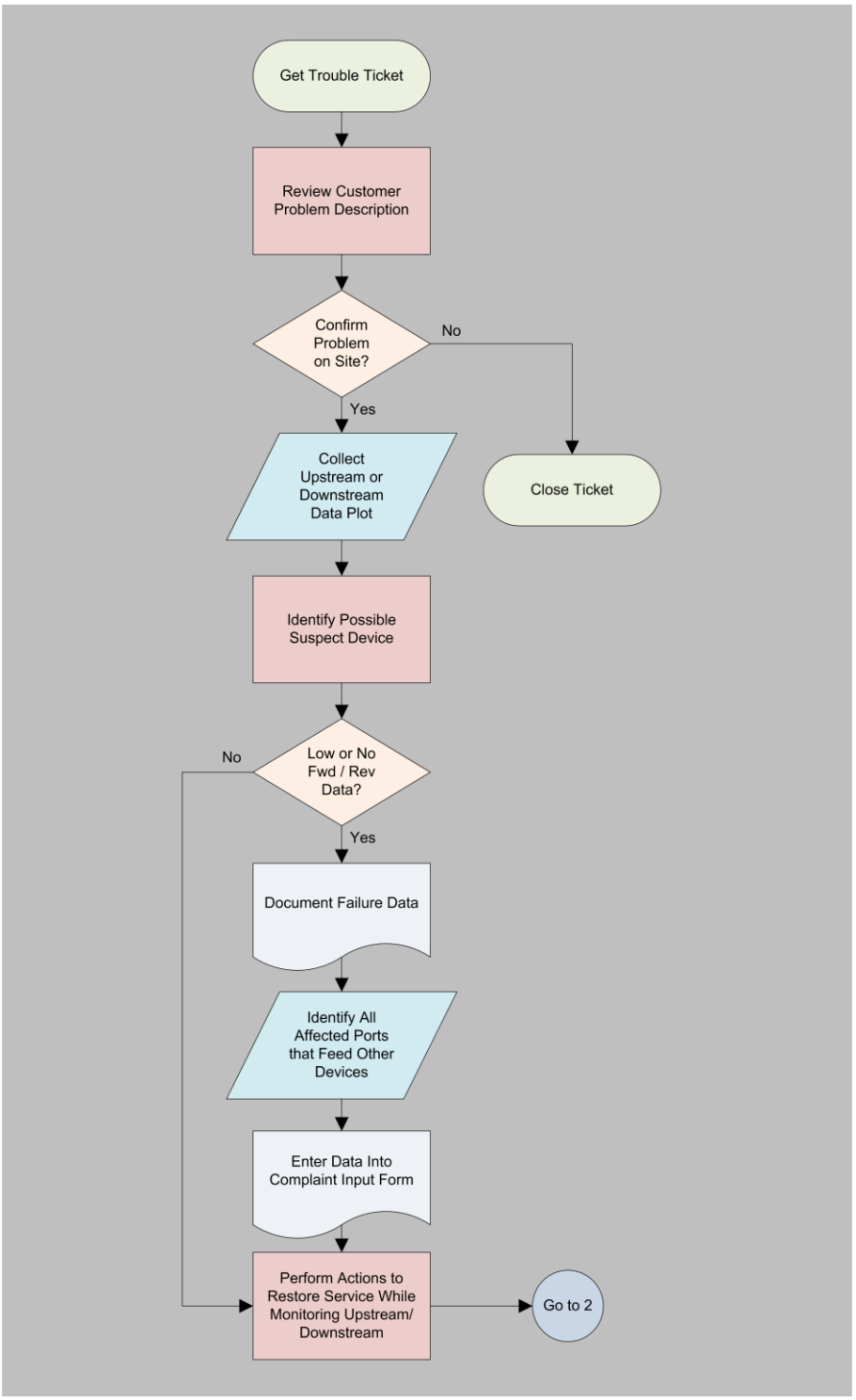
Data collection can help you identify possible suspect devices. If there is little or no data in one direction or another:

- Document the failure data.
- Identify all of the affected ports that feed other devices.
- Complete the complaint input form.

Try to Restore Service

If your investigation does not reveal a significant data loss in either the forward or reverse path, try performing local actions, such as moving wires or equipment and unplugging and replugging connectors, to restore service while monitoring the upstream or downstream data flow. If these actions do not restore service, the problem may be out in the network. Continue your troubleshooting efforts as described next.

Troubleshooting at the Residence



At the RF Amplifier

If you are unable to restore service at the residence, continue troubleshooting with the next amplifier or node upstream of the customer in the network.

Note: When testing in the network, it is best to have a second technician stationed at the next amplifier for testing forward path, or at the headend for testing the reverse path.

Inspecting the Amplifier or Node

Perform a visual inspection of the upstream amplifier or node to determine the condition of the unit in general and all input and output connections in particular. Open, inspect, and restore any suspect input or output connections. If these measures restore service, document your findings and close the trouble ticket.

Note: If any weather boots surrounding the connectors are cracked or missing, replace them before completing your inspection.

Checking External Connections

If these measures fail to restore service, try moving the amplifier or node if possible, and also try applying pressure to all hardlines. If these actions result in a return of service, verify that all connections have the correct fittings (this may require disassembly) and are tightened per manufacturer torque specifications. See *Suggested Hardline Connector Installation Technical Bulletin*, part number 4038184 for details.

If any of these measures restores service, document your findings and close the trouble ticket.

Checking Internal Connections

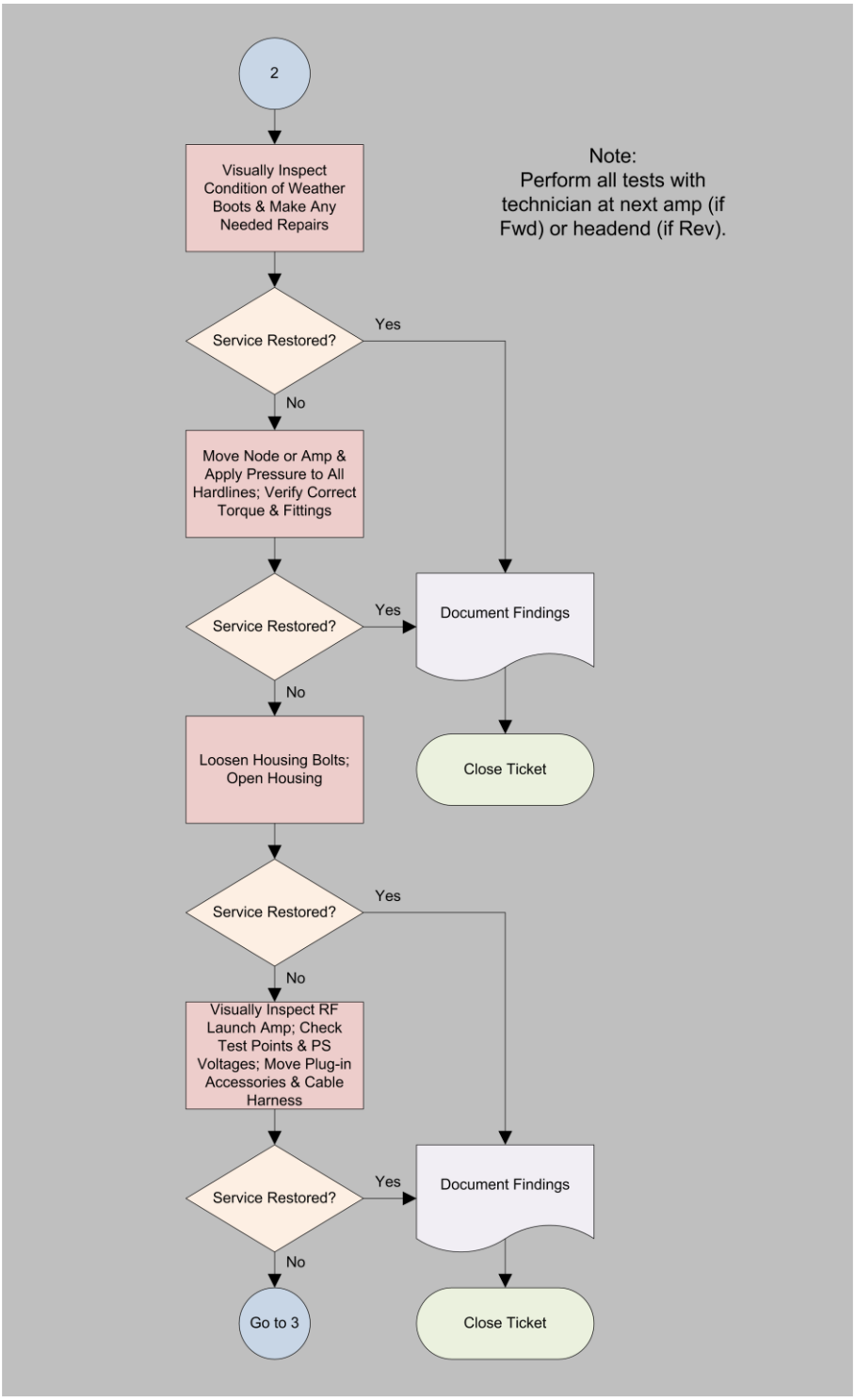
If service remains impaired, loosen the bolts holding the amplifier or node housing together, and then open and reclose the housing. Note any loose housing bolts and tighten using the torque and sequence provided in the documentation. Check to see if this restores service. If so, document your findings and close the trouble ticket.

If service is still not restored, try the following:

- Visually inspect the RF launch amplifier for white residue (indicating water intrusion), excessive heat, illuminated red (warning) LEDs, or anything that looks incorrect or out of place.
- Check the test points and power supply voltages.
- Open the amplifier and move the plug-in accessories and cable harness around to restore any loose or oxidized connections.

If these measures restore service, document your findings and close the trouble ticket. If not, the problem is most likely located in the node upstream. Continue your troubleshooting efforts as described next.

Troubleshooting at the RF Amplifier



At the Optical Node

If you are unable to isolate the problem to the amplifier or node immediately upstream of the customer, the problem is most likely associated with the node upstream. The following troubleshooting procedures are specific to nodes.

Checking the Transmitter

Open the upstream node and check the transmitter feeding the customer portion of the network to verify that it has both Power and Laser LEDs on, indicating normal operation. If either LED is off, check the optical interface board (OIB) for correct AC and DC power supply voltages. If any voltages are absent, take whatever steps are needed to restore power, and then verify that both Power and Laser LEDs are now on.

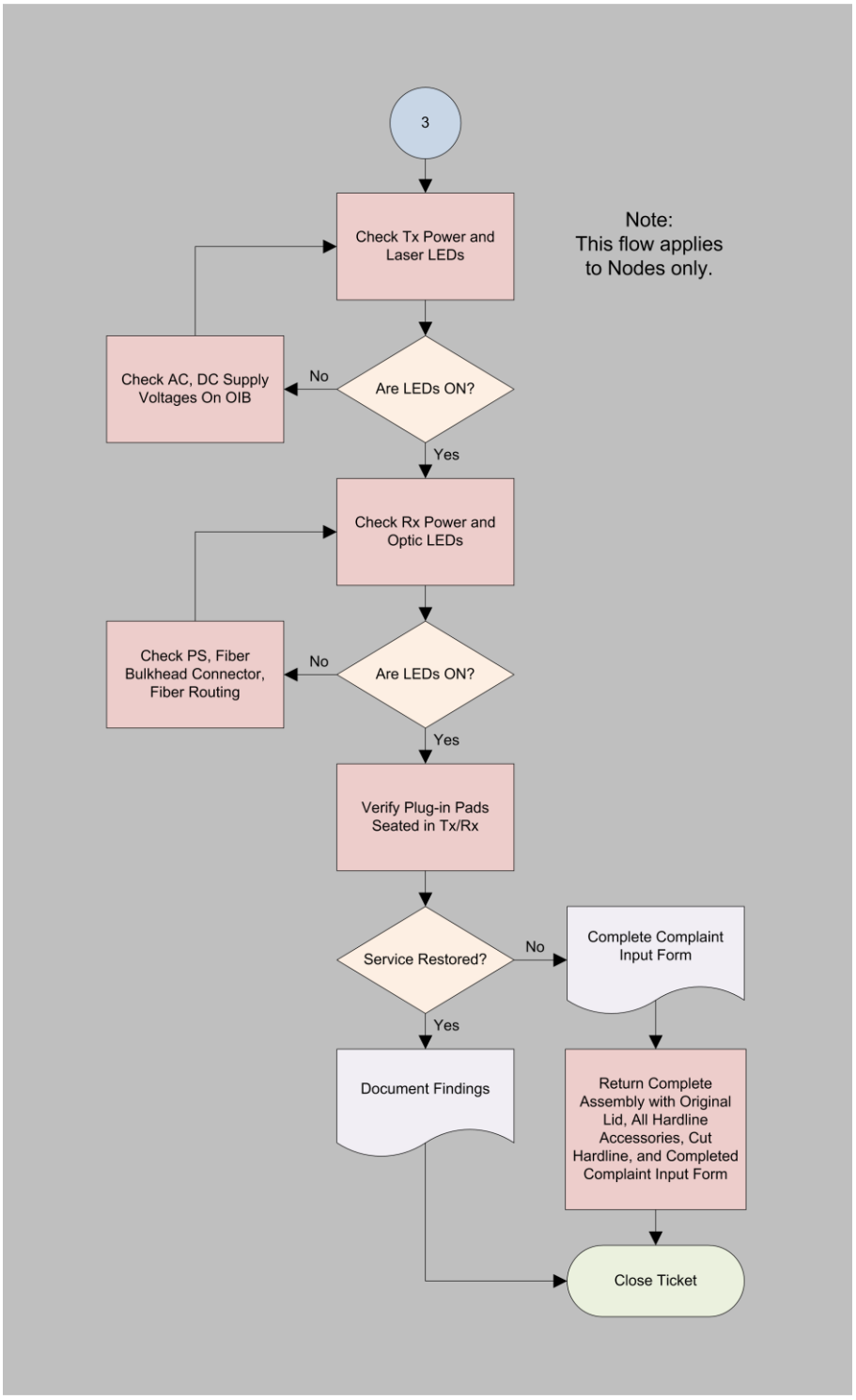
Checking the Receiver

Check the receiver that is fed by the customer portion of the network to verify that it has both Power and Optic LEDs on, indicating normal operation. If either LED is off, check the associated power supply, fiber bulkhead connector, and fiber routing. Take whatever steps are needed to restore normal operation, and then verify that both Power and Optic LEDs are on.

Checking Plug-In Pads

If either the transmitter or the receiver LEDs are on but the unit does not seem to function normally, check that the plug-in pads in the transmitter or receiver are seated correctly. If in doubt, remove and then reinsert each pad in turn. If this procedure restores service, document your findings and close the trouble ticket.

Troubleshooting at the Optical Node



Returning Equipment for Repair

If the procedures in this guide fail to restore service, complete the ***Complaint Input Form*** (on page 13) and return it together with the complete node assembly and its original lid, all hardline accessories, and the original hardline (cut and leave attached to node).

Note: Before returning any equipment for repair, contact customer support for your area to obtain a return materials authorization (RMA) number.

Complaint Input Form

Include this complaint form with any product shipped back under RMA.

Preliminary Case Information

Company Name			
Technician Name		Contact Phone #	
Environmental Conditions	Date	Time	Temp
Subscriber Complaint/Event (describe in detail)			
Affected Subscribers	Number	Zone/Area	
Upstream or Downstream EOL Stealth Monitoring Point			
Failure Data Plot of FWD or REV Response from Stealth Meter			
Network Info (Digital or Analog) Channel Loading			
Event Cycling (History of Problematic Node or Amp)			

Action That Restores Service Checklist Failure Record

Exterior Physical Movement	Interior Physical Movement
☐ Node Housing	☐ Fiber
☐ Hardline	☐ Coax Cable
☐ Bolts/Loosening	☐ OIB
☐ Opening Lid	☐ Attenuator Pad
	☐ Equalizers
	☐ Power Harness

Inspection

Exterior Physical Inspection	Interior Physical Inspection
☐ Boots Shrunk (proper amount of adhesive on hardline)	☐ Tx LED
☐ Physical Inspection	☐ Rx LED
☐ Corrosion	☐ Water
☐ Burnt Smell	

Measurement

Interior Signal Measurements	Interior Signal Measurements (cont'd)
☐ DC Power	☐ FWD Level: Main Aux1 Aux2
☐ AC Power (circle): 40 60 90 VAC	☐ REV Level: Main Aux1 Aux2
☐ Optical Power: Rx Tx	☐ Other:
☐ Optical Power: Rx Tx	☐ RF Test Point Response (Low or No Output Level/Tilt/Flatness/Rolloff)
☐ Optical Power: Rx Tx	

Configuration

Type of Gain Control	Outputs Used/Affected
(circle) Manual Thermal AGC QAM Analog	(circle) Main Aux1 Aux2
☐ Config Module Used:	☐ Other:

For Information

Support Telephone Numbers

This table lists the Technical Support and Customer Service numbers for your area.

Region	Centers	Telephone and Fax Numbers
North America	Cisco Services Atlanta, Georgia United States	For *Technical Support*, call: ■ Toll-free: 1-800-722-2009 ■ Local: 678-277-1120 (Press **2** at the prompt) For *Customer Service*, call: ■ Toll-free: 1-800-722-2009 ■ Local: 678-277-1120 (Press **3** at the prompt) ■ Fax: 770-236-5477 ■ Email: customer-service@cisco.com
Europe, Middle East, Africa	Belgium	For *Technical Support*, call: ■ Telephone: 32-56-445-197 or 32-56-445-155 ■ Fax: 32-56-445-061 For *Customer Service*, call: ■ Telephone: 32-56-445-444 ■ Fax: 32-56-445-051 ■ Email: service-elc@cisco.com
Japan	Japan	■ Telephone: 81-3-5908-2153 or +81-3-5908-2154 ■ Fax: 81-3-5908-2155
Korea	Korea	■ Telephone: 82-2-3429-8800 ■ Fax: 82-2-3452-9748 ■ Email: songk@cisco.com
China (mainland)	China	■ Telephone: 86-21-2401-4433 ■ Fax: 86-21-2401-4455 ■ Email: xishan@cisco.com
All other Asia Pacific countries & Australia	Hong Kong	■ Telephone: 852-2588-4746 ■ Fax: 852-2588-3139 ■ Email: saapac-support@cisco.com
Brazil	Brazil	■ Telephone: 11-55-08-9999 ■ Fax: 11-55-08-9998 ■ Email: fattinl@cisco.com or ecavalhe@cisco.com
Mexico, Central America, Caribbean	Mexico	For *Technical Support*, call: ■ Telephone: 52-3515152599 ■ Fax: 52-3515152599 For *Customer Service*, call: ■ Telephone: 52-55-50-81-8425 ■ Fax: 52-55-52-61-0893 ■ Email: sa-latam-cs@cisco.com

For Information

Region	Centers	Telephone and Fax Numbers
All other Latin America countries	Argentina	For *Technical Support*, call: ■ Telephone: 54-23-20-403340 ext 109 ■ Fax: 54-23-20-403340 ext 103 For *Customer Service*, call: ■ Telephone: 770-236-5662 ■ Fax: 770-236-5888 ■ Email: keillov@cisco.com

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