Fault Diagnostics FTTH

Table of Contents

FTTH Fault Diagnostics

The purpose of this document is to aid service providers in completing high level fault diagnostics

Note: A table of definitions for key terms and acronyms is provided at the end

Step-by-Step

1.1 Overview

The service provider will carry out the following:

- Establish that they are dealing with an FTTH service
- Correlate the fault against network faults or incidents which open eir has raised as an external trouble ticket on UG via the Outage Alerts Tab
- Complete Level 1 Fault Management and proves the fault out of its network and CPE

1.2 Level 1 Fault Management

Level 1 Fault Management consists of high level diagnostics that take place between the service provider and the customer. It is the process whereby the service provider determines that the fault lies with one of the following:

- The open eir network
- The service providers network
- CPE

The service provider has a variety of checks to assist them in the diagnostic process

1.2.1 Troubleshooting Steps

The service provider will confirm the status of the CPE lights in conjunction with the customer

It is important for the service provider to ascertain the serial number for the customers ONT. This will greatly assist with the fault diagnostics.

1. Ask the customer to confirm the Serial Number on the ONT
2. Check the status of the lights on the ONT
3. Power light Status: Power light should be on
4. LOS light Status: demonstrates communication between the fibre optic cable and the ONT. If LOSLED is on, it indicates that there is an issue between the ONT and the exchange and no signal is being received

ONT

You need to confirm with the customer if the ONT is receiving power, the first thing the customer needs to confirm is if the Power light is lit green

The LOS light

The Serial Number should be located on a sticker on the front of the ONT

5. PON Light Status: The ONT PON light should be steady green. If it is flashing green, the common causes are:

    a) Incorrect ONT Serial Number

    b) Incorrect/Rogue ONT

Note: a flashing PON light indicates that the installation was not fully completed

ONT

The PON light indicates the presence of the Optical signal coming from the exchange.

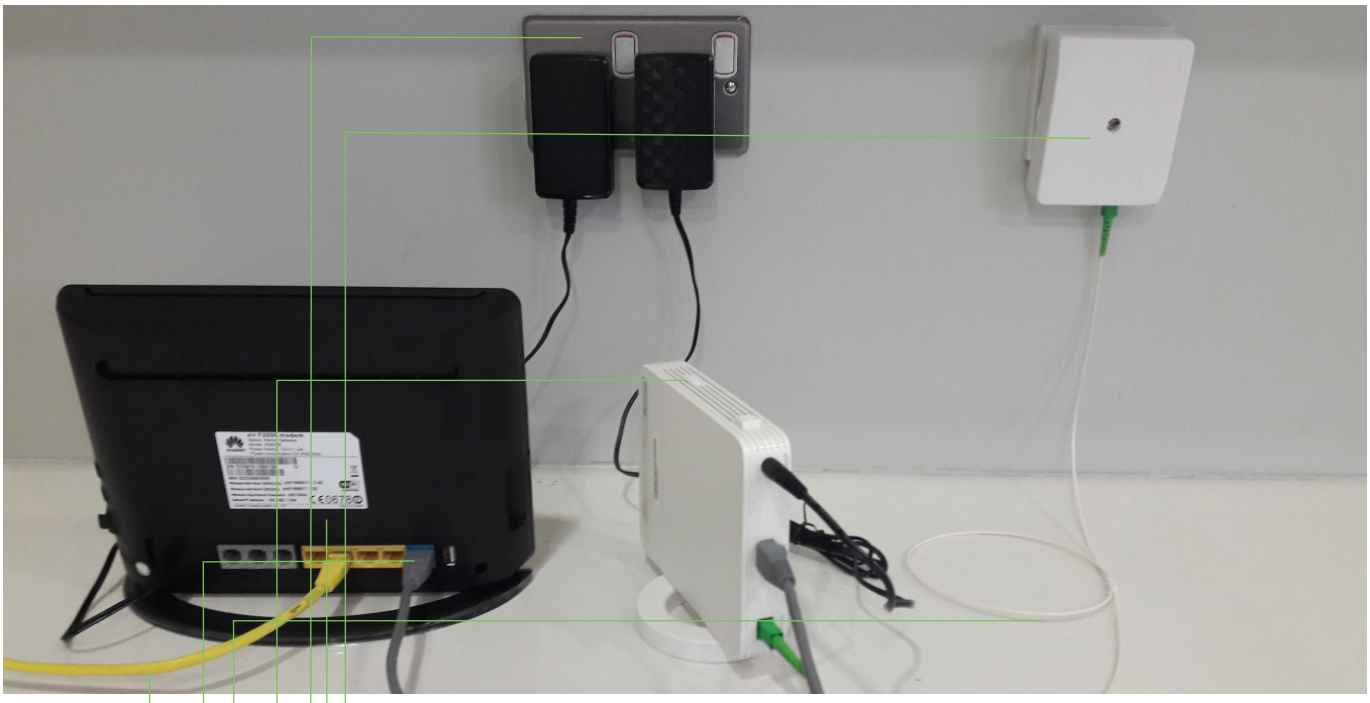
The LAN light demonstrates communication between the ONT and the Modem.

6. Physical Setup: Check the connections from the NTU to the ONT **(ensure the fibre optic cable is fitted correctly, do not remove)**. Check the connections from the ONT to the Modem; check the status of the LAN light.

   Ensure the customers setup is in accordance with the physical setup in the below image.

   If there is an 'On' and 'Off' switch at the double socket, the customer is to ensure that it is switched to the 'On' position. If the ONT is still not receiving power, ask the customer to try to connect the ONT to a different power socket.

In Home Set Up



7. Check steps from 2-5
8. Reset the Modem (check if faulty)
9. Attempt to restore the link between the ONT and the CPE(Modem) by resetting the ONT

To reset the ONT, the customer needs to insert a pen, pin, paper clip, needle or a similarly shaped object into the reset pinhole located on the top of the ONT for approximately 10 seconds. When the lights on the base of the ONT flash off – the reset has been successful Remember to check Sync and Radius after doing this.

10. Check steps from 2-5

1.2.2 Sync Test

Run a Test Synchronisation for NGA – TSN in UG and check the connection status in Radius Lookup Tool to see if the FTTH connectivity is down

Test Synchronisation for NGA

Test Synchronisation for NGA Result
Test Synchronisation for NGA reference number: EIR-TSN-18738309

Notification Type: Completed

Telephone No.	Current Profile
8882-4327434	150M_30M_F

Test Results

Test Type: SYNC
Test Date: 19/05/2017 10:01:17

Set Up

Line Profile	Service Profile
HG8010-30M	HG8010

Status

PORT Status	ONT Run Status	ONT Admin Status	MAC Address
Active	NORMAL	Up	84-BE-52-93-23-AA

Values

RX Power Unit: 0.01 dBm.	TX Power Unit: 0.01 dBm.	Last Up Time	Last Down Time	Last Down Cause	Serial No
-2060	201	2017-05-17 14:18:23	2017-05-09 14:35:56	LOSI	4857544 3F1997B85

Above is a sync test where the ONT is active. For verification purposes, please supply the serial number that is located on the ONT

PORT Status **Active**

ONT Run Status **Normal**

ONT Admin Status **Up**

This result shows that the ONT is up and there is a signal being received.

THE ABOVE SYNC TEST SHOWS NO ISSUES ON THE NETWORK SIDE AND A FAULT SHOULD NOT BE LOGGED WITHOUT FULL AND COMPLETE TROUBLESHOOTING OF THE CPE

MAC Address

This is the MAC address for the modem that is connected to the ONT. If there is no MAC address present, this indicates an issue with the modem. If the test results indicate that there is a possible issue with the modem, perform the following tasks:

Check that the cables are connected correctly, ensure the power is on and reset the modem.

If there is still no MAC address – replace the cables or modem if necessary

Last Down Cause

Last Down Cause Refers to the reason for the last Loss of Signal, and indicates why the broadband dropped the last time the ONT was offline. If the ONT is currently offline this will offer an explanation. If the ONT is currently online, check how long it has been up before completing troubleshooting.

Dying-Gasp

This means the last time the ONT was offline was due to a loss of power – the ONT was switched off, reset or there was a Power Cut

LOS

Loss of Signal – This means there was a loss of fibre signal to the ONT – This could be a network fault or the patch cable from the NTU to the ONT – Check all cables are seated correctly, power cycle and reset the ONT to see if service will return.

Double check the OLO dashboard for Outages on the gateway to see if the service in said area is broadcast or no

LED	STATUS	DESCRIPTION
LAN	On	Ethernet Connection is normal
	Blinking	Data is being transmitted through the Ethernet Port
	Off	Ethernet connection is not set up
POWER	Green	The GPON Terminal is powered on
	Orange	The backup battery is supplying power
	Off	The GPON Terminal is powered off

PON LED	LOS LED	DESCRIPTION
Off	Off	The ONT is disabled by the OLT
Fast blinking (Twice per second)	Off	The ONT tries to create a connection to the OLT
On	Off	A connection is created between the ONT and the OLT
Off	Fast blinking (twice per second)	The receive optical power is too low
Fast blinking (twice per second)	Fast blinking (twice per second)	Rogue ONT detected by OLT

LEDs on the HG8010

1.3 Fault Validation

Validation steps to be undertaken prior to logging a fault

1.3.1 Fault Validation Checklist

- Query fault with end user and status of equipment in customer's premises
- Reset ONT
- Synch Check
- Synch History
- Performance test
- Check ONT port speed

1.3.2 OECC Requirements

OECC requirements when logging a fault

- What is the issue (clearly state in the notes and select the appropriate report code)
- Serial number for the ONT
- Check the status of the lights on the ONT (PWR, LOS & PON) and note current state
- Check connections from the NTU to ONT (optical) & from the ONT to Router (Ethernet) verify this has been done
- Manually reset the ONT after checking

1.3.3 Mandatory FNH Questions

- Was all appropriate CPE plugged in?
- Was the customer ONT switched on during diagnosis?
- Has the customer the correct CPE for their product?
- Did the customer try rebooting their CPE (Home-gateway) and ONT?
- Was a Test Synchronisation carried out?
- Has a fault diagnosis been carried out?
- Is this a repeat fault?
- Is it confirmed that the fault is not in the service provider's network or CPE?
- Is it confirmed that the fault is not in the end user's CPE?

  If there is no issue with the condition of the line then the assumption is that there is a problem with the user CPE (refer to WIFI document). If there is an issue with the line then it is imperative that the fault is diagnosed correctly

1.3.4 FTTH Fault Logging

The service provider then raises an external trouble ticket on UG via the FNH order type (Fault on NGA FTTH).

For FTTH lines, POTS and broadband line faults are treated independently and there is no requirement for the NGA service provider to confirm that POTS service is operating normally. The CLI number is used for reporting NGA faults.

There are a number of different fault types that can be logged by the service provider to open eir on the UG using the Fault on NGA FTTH (FNH) Order. A maximum of five fault symptoms can be selected on an FNH fault report. It is imperative that the correct report code is used when logging a fault to ensure an efficient resolution of the issue.

FTTH NGA Fault Report Codes

CODE	DESCRIPTION
413	Install fail
366	Low Speeds to Customer
368	Intermittent Drops
369	Errors
378	Power Light Off
379	PON Light Off
380	PON Light Flashing
381	Loss of Signal (LOS) Light On Permanently
382	Loss of Signal (LOS) Light Flashing
386	ONT not responding
407	Fibre Wall Outlet
412	Multicast Unavailable

1. 413 **Install Failed**
   The service has never worked. This fault code should be used for Early Life Faults
2. 378 **Power Light Off**
   The ONT is not powered up
3. 379 **PON Light Off**
   Loss of Optical Signal in ONT
4. 380 **PON Light Flashing**
   ONT has an optical signal but has not synchronised to the OLT
5. 381 **Loss of Signal (LOS) light on permanently (RED)**
   The optical signal has been lost
6. 382 **Loss of Signal (LOS) light flashing (RED) on ONT**
   The optical power is too low or the OLT detects that the device is a rogue ONT
7. 386 **ONT not responding**
   Power connected to ONT and switched on but not responding
8. 407 **Fibre Wall Outlet**
   The open eir supplied internal fibre or the fibre wall socket has been visibly damaged
9. 412 **Multicast Unavailable**
   Multicast has failed to a single end user but is available to other end users served from the same cabinet. Multicast has been provisioned for the end user and the logical connectivity is in place (BPM&BPE /VAM)

1.3.5 Fault Reporting

The process for standalone NGA fault reporting is the same as for POTS based FTTH NGA except that the CRN number is used for reporting NGA faults.

Fault Validation rules on UG

- The fault is rejected if the service provider has not attempted the TSN test in the last hour, when logging a FTTH fault
- For all other report codes a sych test is performed to check the ONT status and RX power level
  - If the ONT is up and the RX power level is not less than -25 dB, UG will reject the fault
- If the ONT is down and last down cause is dying gasp (loss of mains power):
  - Report code 386 (ONT not responding) → fault is accepted
  - Any other report code used → fault is rejected

Any fault on the customer side of the ONT would be a FIS or in-home fault.

When logging a FIS for FTTH, use the Fault On Modem Option

- ☑ Fault on Modem
- ☐ Fault on Dataport Extension
- ☐ Fault on Set top Box
- ☐ Fault on Multiroom Set Top Box
- ☐ Fault on Wireless Device-Homeplug
- ☐ Fault on Ethernet Cable

1.3.6 Fault Reporting Form

FNH

☑ *Existing CLI

*CRN/Telephone No. ____ – ____

☑ *FAULT DETAILS

What are the symptoms of your fault?
Please select from the following options (max of 5):

- ☐ Low Speeds to Customer
- ☐ Intermittent Drops
- ☐ Errors
- ☐ Power Light Off
- ☐ PON Light Off
- ☐ PON Light Flashing
- ☐ Loss of Signal (LOS) Light On Permanently
- ☐ Loss of Signal (LOS) Light Flashing
- ☐ LAN Light Off
- ☐ ONT not responding
- ☐ Fibre Wall Outlet
- ☐ NGA Install Failed (413)
- ☐ Multicast Unavailable (412)

Please answer all the following questions:

*Was all appropriate Customer Premises Equipment (CPE) plugged in? ▾
*Was the Customer ONT switched on during diagnosis? ▾
*Has the customer the correct CPE for their product? ▾
*Did the customer try rebooting their CPE (Homegateway) and ONT? ▾
*Was a Test Synchronisation Check carried out? ▾
*Has a fault diagnosis been carried out? ▾
*Is this a repeat fault? ▾
*Is it confirmed that there is no Fault in the Operator's Network ▾
*Is it confirmed that there is no Fault in the Customer's CPE ▾

Please enter below any additional remarks that may assist us in repairing the fault:

1.3.7 Fault Template

Template for adding notes to the fault when logging through the UG

ONT 16 Digit Serial No: xxxxxxxxxxxxxxxx
ONT Power light: on/off/flashing
ONT LOS light: on/off/flashing
ONT PON light: on/off/flashing
Connections checked:
Router checked:

1.4 Jargon Buster

ACRONYM OR TERM	DESCRIPTION
Backhaul	Connection from local exchange to service providers network
Bitstream Plus	Broadband Product
CLI Number	Command Line Interface: Customers landline telephone number
CRN	Circuit Reference Number: Service providers internal circuit reference number. This is another identifier distinct from the CLI number
CPE	Customer Premises Equipment:
Fault Symptoms	Issue as reported by the end user. For instance, “my broadband is slow”
Fibre Termination Unit/Fibre Wall Outlet	Box in home where external Fibre cable is connected. Passive piece of equipment, no option to power on/off. Also known as an “NTU” see below
FIS	Fault on In-home Services: Service order(Fault Report) that allows a service provider to report a specific fault via the UG specific to in-home services IF SIGNED UP
IDS	In Home Diagnostics: Service Order: Service Order (Fault Report)that allows a Service Provider to request an On Site Diagnostics of the Fault – If Signed Up

ACRONYM OR TERM	DESCRIPTION
FNH	Fault on fibre to the home. Service order that allows a service provider to report a fault via the UG specific to FTTH
GPON	Gigabit Passive Optical Network: Technical term for a fibre optic cable/equipment that can carry data up to 1,000 Mbps
GPON Port	Port within the exchange where the fibre optic cable is connected
GPON Terminal	Fibre optic equipment in customer premises (white box). Also known as the "ONT" see below
Install Fail	Service hasn't worked since installation. Any fault report in a situation where the service has not worked at all. It can also be used for Early Life Faults – a fault within the first 28 days of service.
Local Handoff	Also known as "Demaraction Point". open eir are responsible for the network elements from the exchange up to the demarcation point, which for FTTH is the ONT. Service providers/customers are responsible for hardware elements beyond the demarcation point into the home.
Logical Connectivity	Software in the network that enables delivery of services. Services/products (for example broadband, VOBB, TV etc. that are carried on the physical fibre connection to the home)
LOS Light	Loss of Signal. This light is present on the ONT.
Multicast	Software / configuration that enables delivery of TV service over broadband
NGA	Next Generation Access: Providing higher speed broadband including Fibre to the Cabinet (FTTC) broadband at speeds up to 100 Mbps. Fibre to the Home (FTTH) broadband with faster speeds up to 1,000 Mbps now provided at locations around Ireland
NTU	Network Terminating Unit: Box in home where external Fibre cable is connected. Passive piece of equipment, no option to power on/off. Also known as a "Fibre termination unit/wall outlet" see above
OLO Dashboard	Service providers IT system where fault communications are present from open eir relevant to the fibre optic network

ACRONYM OR TERM	DESCRIPTION
OLT	Optical Line Terminal: Equipment in the exchange which contains the FTTH ports to which the Fibre Optic cable is connected
ONT	Optical Network Terminal: Equipment in the customer's premises to which the Fibre Optic cable is connected
open eir Service Termination Point	Also known as the "Demarcation point". It is the point in the customer's premises where the open eir network ends and the customer's equipment begins
Operator Site	Location where another Service Provider has equipment
Optical Module (of an ONT NNI Port)	Network to Network Interface: (Optical to Ethernet) The ONT interfaces the Optical network (openeir FTTH line) to the Ethernet Network (Customers equipment)
Optical Power	The level (measured in Db's that the Optical signal (laser light) is transmitting / receiving at
PON Light	Passive Optical Network Light: Indicator light on the ONT indicating the presence of the Optical signal coming from the exchange
POTS	Plain Old Telephone Service: PSTN / ISDN Telephone service delivered over copper
Repeat Fault	A second fault with the same symptoms as an initial fault report
Rogue ONT	An ONT connected to a port on an incorrect OLT. The ONT and the OLT must match within the open eir network for the FTTH line to operate
RX Power Level	The level (measured in Db's that the Optical signal (laser light) is receiving at
Sync Check	Test performed on a broadband line to check that data is flowing at the correct rate
Radius Check	Test performed on a broadband line to check that the line is authenticating, ie the customer can get access to the Internet

ACRONYM OR TERM	DESCRIPTION
Test Synchronisation	Sync Check. See above
TSN	Test Sync NGA. The service order type used in the Unified Gateway (UG) to perform a Sync Check on a Fibre line
VUA	Virtual Unbundled Access. Backhaul service used to deliver broadband traffic through the open eir network on behalf of another Service Provider
WEIL Handoff Point	Wholesale Ethernet Interconnect Link. The Handoff point between the open eir network and another Service Providers network