# Layer 2 Performance Measurement and Reporting Regime

## 1. Introduction

### 1.1 Background

(a) This document describes the Local Fibre Company (**LFC**) Performance Measurement and Reporting Regime for Layer 2 traffic carried within the Network. The document assumes single-ended testing; however, LFCs may implement dual-ended testing.

(b) Crown Fibre Holdings Limited (**CFH**) manages the Government's $1.3 billion investment in the Ultra-Fast Broadband Initiative. Accordingly, CFH has contracts with each of the four LFCs, which include commitments to meet Service Levels for Layer 2 traffic performance and service availability (**Layer 2 Traffic Service Levels**).

(c) Any failure to meet the Layer 2 Traffic Service Levels means the affected Services are marked as unavailable for the period of the failure, and thus contribute to the availability service levels.

(d) The Chorus and Enable contracts specify that a suitable Layer 2 Traffic Service Level and measurement regime is to be developed by CFH in consultation with the LFC and the Telecommunications industry, with the delivery dates to be documented in the Network Deployment Plan.

(e) In December 2014, CFH submitted "UFB Layer-2 Traffic Measurement Regime - A consultation paper on: The Measurement of Ultra-Fast-Broadband Layer-2 traffic performance in New Zealand". This consultation paper provided a series of principles and considerations for industry discussion. Feedback was provided to CFH through the Telecommunications Carrier Forum (**TCF**) as well as through various discussions held with Retail Service Providers and LFCs.

(f) This paper is an updated Layer 2 traffic Performance Measurement and Reporting Regime that captures the feedback from TCF, the RSPs and the LFCs. CFH has released this for comment as part of the industry consultation process.

(g) CFH expects that the key conditions and timings of this Performance Measurement and Reporting Regime will be included in the Chorus and Enable Network Deployment Plans and the Wholesale Service Agreements.

### 1.2 Overarching Requirement

(a) The measurement of the Performance Measurement and Reporting Regime must, as far as possible, provide an accurate representation of the actual performance of the Network. Any probe configuration and routing/switching of test traffic through the Network must take this requirement into account.

(b) If there are any inconsistencies between the applicable Network Infrastructure Project Agreement (**NIPA**) (or any arrangement that supersedes the applicable NIPA) and this document, then the NIPA takes precedence.

## 1.3 Definitions

Capitalised terms used but not defined in this regime will have the meaning set out in the applicable NIPA. In addition, unless the context indicates otherwise:

**Availability Period** means the shorter of:

a) the period of the previous 12 months; and

b) the period of months since the LFC last failed to meet the relevant Service Level;

**Burst Size** means the maximum number of Bytes transmitted in a period defined by the bandwidth profile;

**Committed Burst Size** (**CBS**) means the burst size defined for a CIR bandwidth profile for a Layer 2 product defined in the WSA;

**Committed Information Rate (CIR)** means Layer 2 traffic that conforms to the CIR specification set out in Section 3;

**End User** has the meaning given to that term in the Telecommunications Act 2001 (under the definition "end-user");

**End User Services** means the access services provided by the LFC under the WSA;

**Excess Burst Size (EBS)** means the burst size defined for an EIR bandwidth profile for a Layer 2 product defined in the WSA;

**Excess Information Rate (EIR)** means Layer 2 traffic that conforms to the EIR specification set out in Section 3;

**Layer 2 Traffic Service Levels** means the contracted Layer 2 traffic Service Levels as described in the NIPA and further described in the UFB Wholesale Service Agreement Bitstream Service Level Terms, and summarised in Section 3 of this paper;

**Measurement Interval** means a Port Utilisation Measurement Interval or Probe Measurement Interval;

**Measurement Interval Number** means the specific Measurement Interval in a month. A 30 day month will consist of 8,640 Probe Measurement Intervals and a 31 day month will consist of 8,928 Probe Measurement Intervals, a 30 day month will consist of 2,880 Port Measurement Intervals and a 31 day month will consist of 2,976 Port Measurement Intervals. Measurement Interval Number 0 is the first Measurement Interval of a month;

**Network** means the contracted UFB Network;

**OAM Probe** means a device that is built-in, or connects, to an End User ONT or ONU that is used to measure the Layer 2 Traffic Service Levels between the POI Probe and OAM Probe by means of Synthetic Test Traffic;

**OLT Probe** means a device connected to an OLT by the LFC that measures the Layer 2 Traffic Service Levels between the POI Probe and the OLT Probe and provides the Y.1731 reflector. An OLT Probe must be connected to each OLT via a Test ONT;

**Performance Measurement and Reporting Regime** means the regime discussed in this paper and is used to measure the contracted Service Levels;

**POI Probe** means an industry standard device (for example ITU standard G.8013/Y.1731 compliant) located by the LFC at a POI that measures the Layer 2 Traffic Service Levels, and generates Synthetic Test Traffic, between the POI Probe and an OLT Probe or a OAM Probe. The POI Probe must measure traffic to/from each EAS within a POI;

**Port** means a physical port within the Network, excluding UNI, E-NNI and PON ports. All virtual ports and sub-interfaces within the physical Ports must however automatically scale up to the physical Port capacity otherwise they will also form part of a Port;

**Port Utilisation** means the average bandwidth utilised on a Port, expressed as a percentage of the total bandwidth available on that Port, measured over a five minute interval for each five minute interval of every day;

**Port Utilisation Measurement Interval** means a five minute interval used for Port Utilisation measurements;

**Port Utilisation Threshold** means the maximum Port Utilisation, as set in Section 7, and updated from time-to-time in accordance with the principles set out in this document;

**Port Utilisation Threshold Breach** means any Measurement Interval in which the Port Utilisation of any measured Port exceeds the Port Utilisation Threshold. Any Port Utilisation Threshold Breach is a Service Level Breach;

**Probe Failure** means the occurrence of a failure to meet the Layer 2 Traffic Service Levels (within any five minute interval) by any Reference Probe;

**Probe Measurement Interval** means a five minute interval which consists of a minimum of 3,000 sample measurements. The LFC may discard the worst 1% of the sample measurements;

**Probe Performance Threshold** means a FL of 25% or greater, as measured between the OLT Probe and POI Probe in accordance with Section 8. Any FL above the Probe Performance Threshold is a Service Level Breach;

**Probe Performance Threshold Breach** means any Measurement Interval in which a POI Probe or an OLT Probe reports that FL is greater than the Probe Performance Threshold. Any Probe Performance Threshold Breach is a Service Level Breach;

**Production Splitter** means a PON splitter carrying UFB Services;

**Reference Probe** means an OLT reference probe and/or a POI reference probe;

**Reference Probe Breach** means the occurrence of at least five Probe Failures within the Availability Period on any single Port or combination of Ports in the Network;

**Sampling Rate** means the rate at which Synthetic Test Traffic is sampled and measured. The Sampling Rate for all Synthetic Test Traffic must be every ≤100 milliseconds (i.e. a minimum of 3,000 samples per five minute interval);

**Service Level Breach** means when the Layer 2 Traffic Service Levels are exceeded, as indicated by a Port Utilisation Threshold Breach or a Probe Performance Threshold Breach. A Service Level Breach will contribute to the NIPA and WSA Downtime Service Levels, (both the Maximum Downtime Service Level and the Average Downtime Service Level) for any End Users who may be affected by that breach, regardless of actual impact;

**Synthetic Test Traffic** means test traffic generated by the POI Probe. This traffic must be marked as drop ineligible (as per ITU standards G.8013/Y.1731 08/2015) and injected continuously at a

minimum rate of 10 frames per second, and delivered over traffic bearing Ports. Synthetic Test Traffic may be sent over a test-only service tag, and is to be treated by the Network elements in the same way that service frames are treated; and

**Test ONT** means the ONT to which the ONT test probe is connected or within which it is housed. The Test ONT must connect to the OLT through a production splitter.

## 1.4 Abbreviations

**CBS** means the burst size defined for a CIR bandwidth profile for a Layer 2 product defined in the WSA

**CFH** means Crown Fibre Holdings Limited

**CFM** means Connectivity Fault Management, which is used for fault isolation and link connectivity by the RSPs

**E-NNI** means External Network-Network Interface

**EAS** means Ethernet Aggregation Switch

**EBS** means the burst size defined for an EIR bandwidth profile for a Layer 2 product defined in the WSA

**ETH-DM** means Ethernet Delay Measurement function (as defined in G.8013/Y.1731 (08/2015))

**ETH-SLM** means Ethernet Synthetic Loss Measurement (as defined in G.8013/Y.1731 (08/2015))

**FD** means Frame Delay (as defined in the TCF Ultra-Fast Broadband Ethernet Access Service Levels document)

**FDV** means Frame Delay Variation (as defined in the TCF Ultra-Fast Broadband Ethernet Access Service Levels document)

**FL** means Frame Loss as defined in the TCF Ultra-Fast Broadband Ethernet Access Service Levels document).

**GEM** means GPON Encapsulation Method used in GPON to transport data frames

**GPON** means Gigabit Passive Optical Networks as defined by ITU-T recommendation series G.984.1 through G.984.6

**ITU** means the International Telecommunications Union, being the United Nations specialized agency, which deals with issues concerning information and communication technologies

**LAG** means a Link Aggregation Group that combines a number of Ports to make either a single high capacity data path or separate data paths to implement load sharing and/or redundancy among Ports within the group

**LFC** means Local Fibre Company, which, for the purposes of this regime, includes Chorus Limited and Enable Networks Limited

**MEF** means the Metro Ethernet Forum

**MEG** means Maintenance Entity Group (defined in Y.1731)

**MEP** means Maintenance Association End Point (defined in Y.1731)

**NIPA** means the Network Infrastructure Project Agreement, being the agreements between CFH and each LFC

**OLT** means Optical Line Terminal

**ONT** means Optical Network Terminal

**ONU** means Optical Network Unit

**OVC** means Operator Virtual Connection

**PM** means Performance Measurement, as defined in MEF-35

**POI** means Point of Interconnect

**PON** means Passive Optical Network as defined in ITU standard G.984.5 (May 2014)

**RSP** means Retail Service Provider

**SLA** means Service Level Agreement

**SLR** means Synthetic Loss Reply

**SOAM** means Service Operations and Measurement

**UFB** means Ultra-Fast Broadband

**UNI** means User Network Interface

**WSA** means Wholesale Services Agreement

## 2. Timeline

2.1 This document incorporates feedback received to date from RSPs and the LFCs.

2.2 CFH expects the LFCs to implement this agreement on the following dates, and reflect these dates in the Network Deployment Plans:

(a) Port Utilisation monitored and reported by December 2016;

(b) WSA updated by March 2017; and

(c) Probes monitored and reported by June 2017.

2.3 This regime will be subject to Layer 2 User Acceptance Testing from the above dates and, regardless of the WSA's status, comes into effect in June 2017.

# 3. Layer 2 Traffic Service Levels

3.1 For completeness, the Layer 2 Traffic clause from Schedule 5, Annexure 1, clause 6 of the Chorus NIPA is repeated below:

"**6.1** Each End User's traffic must be delivered to the POI to meet the following Service Levels, measured over each five minute interval (24 hours per day):

| | **Frame Delay must be:** | **Frame Delay Variation must be:** | **Frame Loss must be:** |
|---|---|---|---|
| **CIR** | ≤5 mS | ≤1 mS | ≤0.1% |
| **EIR** | n/a | n/a | ≤2% |

At least 99% of the frames within the five minute measurement interval must be within the above Service Levels, otherwise the service is to be considered unavailable for that five minute interval.

**6.2** Measurement of Layer 2 Traffic Service Level:

A suitable Layer 2 Traffic Service Level and measurement regime will be developed by CFH in consultation with the Company and the Telecommunications industry, with the delivery dates to be documented in the Network Deployment Plan."

3.2 Parameters that need to be measured are:

(a) FL

(b) FD

(c) FDV

3.3 For the avoidance of doubt, the following applies:

(a) CFH has approved a change in the FDV metric from 1mS to 3mS for GPON traffic only, but this change only becomes effective once the WSAs are updated and approved by the RSPs. Until that time, the LFCs must comply with a FDV of 1mS or less.

(b) The Layer 2 Traffic Service Levels apply to all traffic, including traffic greater than 100Mbps.

(c) All traffic the LFCs accepts into the Network must be carried in accordance with the Layer 2 Traffic Service Levels.

(d) Any Service Level Breach contributes to service Downtime. The Layer 2 Traffic Service Levels apply continuously and are in force during planned outages; planned outages that impact on the Layer 2 Traffic Service Levels will therefore contribute to Downtime and will be a Service Level Breach.

## 4. Considerations for RSPs

4.1 All traffic a LFC accepts into its Network must be carried in accordance with the Layer 2 Traffic Service Levels.

4.2 The LFC may either police traffic to the service profile on ingress, allowing for a reasonable CBS/EBS as per the Bitstream Service Descriptions in the WSA, or carry all offered traffic according to the Layer 2 Traffic Service Levels.

4.3 The LFC may police any out-of-profile traffic (being the traffic that exceeds either the committed or excess information rate (CIR and EIR), or the burst size (EBS and CBS) specified in the WSA) that an RSP offers to the Network, and this may impact on End User performance. RSPs may therefore want to consider shaping their traffic prior to offering it to an LFC.

## 5. Minimum reporting requirements for the LFC

5.1 The LFC is to develop an SLA report and give this to the RSPs (unless otherwise agreed by the RSPs) and CFH (or its successor) on a monthly basis. The SLA report will include the following information:

*Port Utilisation*

(a) all Port Utilisation measurements for all Network Ports, including Ports not breached if requested by an RSP;

(b) PON Port Utilisation measurements for review purposes;

(c) Port interface drops for all relevant interfaces if requested by an RSP;

(d) the current Port Utilisation Threshold (as set out in Section 6);

(e) the new Port Utilisation Threshold, if the Port Utilisation Threshold needs to be adjusted (as set out in clause 7.6), and the implementation date;

(f) any Port which experiences a Port Utilisation Threshold Breach during the reporting period and the Port Utilisation Measurement Intervals at which the Port Utilisation Threshold Breach occurred;

*Service Level Breach*

(g) any End User Services where the LFC has failed to meet the Layer 2 Traffic Service Levels (including the Default Service Level and Enhanced Service Level) for that End User Service;

(h) any End Users that have exceeded the Maximum Downtime Service Level as set out in the UFB Wholesale Service Agreement Bitstream Service Level Terms and the applicable terms of the relevant NIPA (i.e. Schedule 5 (Service Levels), Annexure / Appendix 1, clause 4.2 - Layer 2 Service Availability – Maximum Downtime), including for Enhanced SLAs (if any);

(i) any breaches of the Average Downtime Service Levels, as set out in the UFB Wholesale Service Agreement Bitstream Service Level Terms and the applicable terms of the relevant NIPA (i.e. Schedule 5 (Service Levels), Annexure / Appendix 1, clause 4.1 - Layer 2 Service Availability – Average Downtime), including fro Enhanced SLAs (if any);

(j) the LFC must also report to CFH on any aggregate breaches (if any) as described in the NIPA;

*Reference and OAM Probes*

(k) the results from any Reference Probes (FD, FDV and FL) on request from the RSP;

(l) any time a Reference Probe reports a measure that exceeds the allowable maximum FD, FDV, or FLR, the Probe Measurement Intervals at which the breach or breaches occurred, the Ports that the POI Probe monitors, and the duration of the Probe Performance Threshold Breach for each affected Port;

(m) any Reference Probe Breach, the Probe Measurement Intervals at which the breach or breaches occurred, the Ports that the POI Probe monitors, and the duration of the Probe Performance Threshold Breach for each affected Port;

(n) any Probe Performance Threshold Breach during the reporting period, the Probe Measurement Intervals at which the breach or breaches occurred, the Ports that the POI Probe monitors, and the duration of the Probe Performance Threshold Breach for each affected Port;

(o) any OAM Probe breaches, the Probe Measurement Intervals at which the breach occurred, and any End Users that may have been affected by the probe breach

(p) any Probe Failures, including the probe identity, date of failure, duration of failure, and restore time; and

*Other*

(q) any additional reporting requirements agreed between the RSPs and LFCs and set out in the WSA. This includes RSPs accessing near real-time traffic stats and Network performance of the Network.

5.2 In addition to the reporting requirements, the LFC should also consider providing:

(a) information relating to which End Users are monitored by which probe on a per-RSP basis (for example, by listing the End Users connected to an OLT and identifying which probe serves that OLT); and

(b) information relating to which End Users are would be affected by high Port utilisation (for example, the End Users connected to each OLT, and the Ports that are between the OLT and the EAS).

5.3 The following data retention rules apply:

(a) data relating to Service Levels, gathered by a probe (e.g. the OAM Probe or the OLT Probe) must be stored electronically and retained for a minimum of 90 days;

(b) monthly reports must be kept for a minimum of 7 years.

## 6. Port Utilisation

6.1 The LFCs are to measure the Port Utilisation of all Ports within their Network between the UNI and the E-NNI, in both directions. The UNI, E-NNI and PON Ports themselves do not need to be measured for SLA purposes. Port Utilisation is a proxy for Layer 2 Traffic Service Level compliance. It does not directly measure Layer 2 Traffic Service Levels.

6.2 If the Port Utilisation measure for all Ports is less than the Port Utilisation Threshold, then the Network is compliant and Layer 2 Traffic Service Levels are met.

6.3 If Port Utilisation for any Port exceeds the Port Utilisation Threshold, then a Port Utilisation Threshold Breach has occurred and all End User Services that have traffic associated with that Port are marked as unavailable for the duration of the time (i.e. the sum of the number of five minute intervals) that the Port Utilisation Threshold is exceeded.

6.4 The Port Utilisation Threshold will initially be set at 95%.

6.5 If the Port Utilisation Threshold has been reduced, and there have been no Reference Probe Breaches for a consecutive three month period following the introduction of the new Port Utilisation Threshold, then the LFC may increase the Port Utilisation Threshold by 1% for every three month consecutive periods during which no Reference Probe Breach occurs until the Port Utilisation Threshold reaches the previous level.

## 7. Reference Probes

7.1 Reference Probes are in place to confirm that the Network is capable of meeting the Layer 2 Traffic Service Levels at the Port Utilisation Threshold, and to identify any Network failures that do not contribute to a Port Utilisation Threshold Breach but do contribute to SLA breaches.

7.2 The LFC will establish a minimum of one OLT Probe per OLT. The OLT Probe is a Reference Probe and will be located in the Test ONT, or will be a separate device connected to the Test ONT. This Test ONT must connect to the OLT via a Production Splitter. The OLT Probe acts as a reflector as defined in ITU standards G.8013 and Y.1731 (08/2015) to reflect Synthetic Test Traffic back to the POI Probe with time stamps.

7.3 The LFC will establish a minimum of one POI Probe per POI. The POI Probe is a Reference Probe and will be located in each EAS, or will be a separate device connected to each EAS. The POI Probe will inject Synthetic Test Traffic into an OVC and measure the FD, FDV, and FL of this Synthetic Test Traffic by means of the traffic reflected by the OLT Probe.

7.4 The OVC that carries the Synthetic Test Traffic must be established between the POI Probe and each OLT Probe. This OVC and the Synthetic Test Traffic must not be prioritised or otherwise treated differently from any other drop ineligible traffic within the Network. The Reference Probe and test OVC will be configured with a standard UFB Bitstream profile of 100Mbps downstream, 50Mbps upstream, and 2.5Mbps CIR in each direction.

7.5 The performance monitoring functions required for Reference Probes are defined in the ITU standards G.8013 and Y.1731 (08/2015)):

(a) Single-Ended Synthetic Loss

(i) One Way SLR (ETH-SLM)

(b) Single-Ended Delay

(i) One Way FD/FDV (ETH-DM); or

(ii) Two Way FD/FDV (ETH-DM).

7.6 If a Reference Probe Breach has occurred due to lack of Network capacity and a Port Utilisation Threshold Breach has not occurred then, unless there is a clear Network failure:

(a) a Service Level Breach has not occurred;

(b) the Network is deemed to be incapable of supporting the Layer 2 traffic performance SLAs at the Port Utilisation Threshold in place at that time;

(c) the current Port Utilisation Threshold must be decreased by 5% (e.g. from 95% to 90%) across the Network; and

(d) within three months of the Reference Probe Breach, the Port Utilisation of all Ports in the Network must be below the new Port Utilisation Threshold. For the avoidance of doubt, this new Port Utilisation Threshold is used for determining if a Service Level Breach has occurred. During this three month period, any Reference Probe Breaches may be ignored; however, any Port Utilisation Threshold Breach is a Service Level Breach.

7.7 If the Reference Probe Breach was not caused by lack of Network capacity and there is a clear Network failure then the LFC does not need to reduce the Port Utilisation Threshold. A Network failure would include for example, the failure of a LAG group or Layer 2 Services Network element (including failure due to Network or software upgrades), but would not include for example, a lack of provisioned capacity (including the failure of a single link in a LAG group).

7.8 If the Probe Performance Threshold is exceeded, then there is a Probe Performance Threshold Breach. The Probe Performance Threshold is set at such a level that any breach is likely to be due to a Network failure that will not show up as a Port Utilisation Threshold Breach.

7.9 If there is a Port Utilisation Threshold Breach, and a Reference Probe Breach occurs as a result, then the Reference Probe Breach may be ignored.

7.10 However, regardless of Port Utilisation, if a Probe Performance Threshold Breach occurs, then all End User Services that have traffic associated with that OLT are marked as unavailable for the duration of the time that the Probe Performance Threshold is exceeded.

## 8. OAM Probes

8.1 On request from an RSP, the LFCs will establish OAM Probes in each point-to-point (typically Bitstream 4) service ONU within 5 business days of receiving the request. These OAM Probes:

(a) will be used to determine compliance with the Layer 2 Traffic Service Levels;

(b) will be used for OAM performance monitoring functions (FLR, FD, FDV, throughput);

(c) may be used for OAM fault management functions (Ethernet Continuity Check, Ethernet Test, etc.). The LFC and RSPs are to agree on the type of test functions to be allowed, and update the WSA relevant operations manuals accordingly;

(d) may be software or hardware based and may be external to the ONT. All hardware or external OAM Probes will terminate on a UNI port that has no other Services provisioned on it;

(e) will be a G.8013/Y.1731 (08/2015) End Point; and

(f) will be configured with a single dedicated test OVC terminating on a POI Probe. The POI Probe will inject synthetic Test Traffic into the test OVC. The OVC will carry CIR (high priority) traffic and be will be configured with a UFB Bitstream 4 profile, as requested by the RSP.

8.2 The LFC will provide an OAM Probe for GPON Services within 5 business days of an RSP request, if the RSP provides reasonable evidence that the GPON End User Service may not be complying with the Layer 2 Traffic Service Levels. Reasonable evidence could include repeat customer complaints, customer-initiated test results, or results of LFC tests to their Customer Premises Equipment. These OAM Probes:

(a) will be used to determine compliance with the Layer 2 Traffic Service Levels;

(b) may be software or hardware based and may be external to the ONT. All hardware or external OAM Probes will terminate on a UNI port that has no other Services provisioned on it;

(c) will be a G.8013/Y.1731 (08/2015) End Point, is an operator MEP, deployed on each OAM Probe, and the MEP is used as a G.8013/Y.1731 (08/2015) reflector;

(d) will be configured with two dedicated test OVCs terminating on a POI Probe. One OVC will carry EIR (low priority) traffic, and one OVC will carry CIR (high priority) traffic. Synthetic Test Traffic will be injected into the test OVCs by the POI Probe. The test OVCs will be configured using a standard UFB Bitstream profile of 100Mbps downstream, 50Mbps upstream, and 2.5Mbps CIR in each direction; and

(e) may be deactivated and/or removed by the LFC once it has been established that the service complies with the Layer 2 Traffic Service Levels.

8.3 Performance Monitoring Functions required for OAM Probes are:

(a) Single-Ended Synthetic Loss

(i) one way SLR (ETH-SLM)

(b) Single-Ended Delay

(i) one way FD/FDV (ETH-DM or;

(ii) two way FD/FDV (ETH-DM)

8.4 Test OVCs and Synthetic Test Traffic must not be prioritised or otherwise treated differently from any other traffic within the Network.

8.5 The results from the OAM Probe will take precedence over the Port Utilisation measurements. Any reported Layer 2 Traffic Service Level Breach from an OAM Probe will count towards the Layer 2 Downtime SLA for that End User.

## 9. Probe failures

9.1 Hardware or software failure of any Probe (including OAM Probe, OLT Probe, or POI Probe) does not contribute to a Layer 2 Traffic Service Level Breach, as long as the LFC repairs the Probe within five business days (or, in the case of OAM Probes and if requested by an RSP, at a time agreed with the RSP). If the LFC does not repair the Probe within five business days (or, in the case of an OAM Probe,

the time agreed with the RSP), then the services the Probe is measuring are marked as unavailable for the period that the Probe is not working.

## 10. RSP/CFH audit rights

10.1 LFCs are to provide RSPs with the right to be able to initiate a review of the Performance Measurement and Reporting Regime when RSPs have reason to believe that the Performance Measurement and Reporting Regime results are not reflective of the Network performance. Reasons for requesting an audit may include:

(a) RSPs receive an abnormally high amount of End User complaints regarding performance even though the Performance Measurement and Reporting Regime results are not reporting any issues; and

(b) RSPs have reasonably determined that performance issues are within the UFB Network; or

(c) RSPs have performed ONT/ONU OAM testing between the UNI and the POI with poor performance results.

10.2 Each party should bear their own costs of conducting the audit. If the audit/review turns out a 'no fault found' then the LFC may pass on the direct actual costs for the audit, with such costs not to include any overhead costs.

10.3 If the audit/review finds a flaw in the regime then the LFC will, within three months:

(a) review the Performance Monitoring and Reporting Regime and make any changes necessary to accurately report on the Layer 2 Traffic SLAs; and

(b) remedy the Network so as to be compliant with the Layer 2 Traffic SLAs.

10.4 The review/audit is to be undertaken by a suitably qualified independent party such as Accenture, KPMG or PWC.

10.5 The maximum number of audits required to be undertaken by the relevant LFC is capped at 1 audit per quarter.

10.6 A review of this regime should be conducted at least 6 monthly to ensure its effectiveness and to take into account improved/amended Industry Standards.

## 11. Change Management

11.1 Changes to this regime will require CFH's (or its successor's) approval, and may only be made after agreement from at least 60% of the RSPs that have connections with the LFC, or if an RSP-initiated audit finds flaws in the regime. The LFCs will be required to consult with RSPs in good faith prior to any changes coming into effect.