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G.983.4
Amendment 1
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A broadband optical access system with increased service capability using dynamic bandwidth assignment
Amendment 1: New Annex A – Performance monitoring parameters

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ITU-T Recommendation G.983.4

**A broadband optical access system with increased service capability
using dynamic bandwidth assignment**

Amendment 1

New Annex A – Performance monitoring parameters

Summary

This annex describes requirements and specifications for the performance monitoring function in
Dynamic Bandwidth Assignment (DBA) for Broadband Passive Optical Network (B-PON) as
G.983.4 AM1. These requirements and specifications provide backward compatibility with the
current ITU-T Rec. G.983.4.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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A broadband optical access system with increased service capability using dynamic bandwidth assignment

Amendment 1

New Annex A – Performance monitoring parameters

1)   New Annex A

Add the following Annex A:

A.1   Scope

Dynamic Bandwidth Assignment (DBA) efficiently allocates resources for variable bit rate traffic transfer over Broadband Passive Optical Networks (B-PON). The requirements and detailed specifications in its core functions have been finalized in the main part of ITU-T Rec. G.983.4. This annex provides extended functionalities of DBA focusing on performance monitoring. It specifies requirements and specifications for these functions. These specifications are implemented in the OLT, and do not have interactions with the ONT. However, since this function has affinity with DBA itself, it is positioned as a normative part of ITU-T Rec. G.983.4 as Annex A.

These requirements and specifications are optional, and do not request any modifications to the existing DBA related recommendations (ITU-T Recs G.983.4 and G.983.7). The use of them depends on operators' policies. This relationship is shown as Figure A.1.
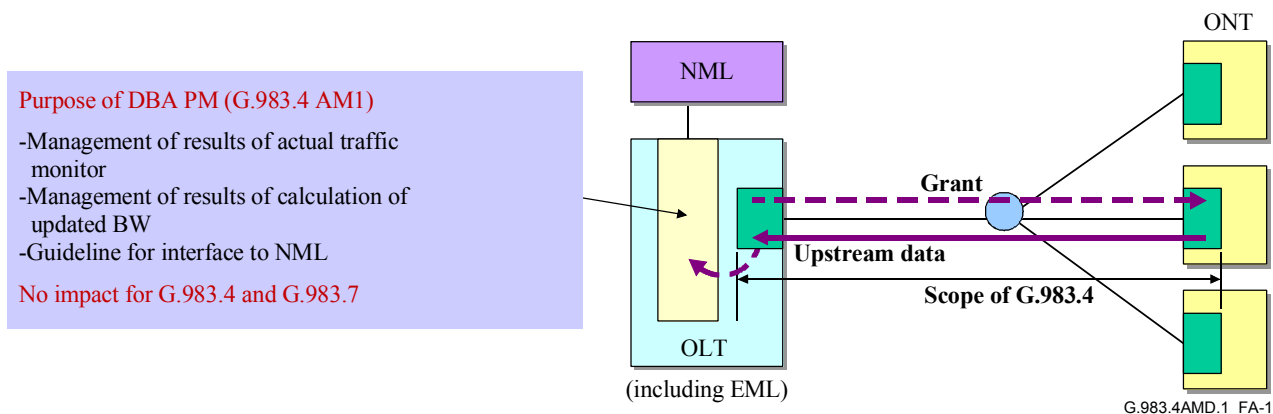

Figure A.1/G.983.4 – Purpose and position of Annex A

A.2   References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[1]   ITU-T Recommendation Q.834.1 (2001), *ATM-PON requirements and managed entities for the network element view*.

[2]   ITU-T Recommendation G.983.7 (2001), *ONT management and control interface specification for dynamic bandwidth assignment (DBA) B-PON system*.

A.3   Abbreviations

This annex uses the following abbreviations:

EMS   Element Management System

NMS   Network Management System

A.4   Requirements for performance monitoring

The performance monitoring function should be generic, independent of implementation of B-PON system. This function does not request any modifications of the existing DBA Recommendations (ITU-T Recs G.983.4 and G.983.7). Objectives of this function are summarized as follows.

–   Provide trending data to indicate if the operator needs to adjust the assignment of guaranteed or additional bandwidths.

–   Provide trending data to determine if the DBA mechanism is performing equitably across T-CONTs of the same type.

The two management entities are regarded as conformed entities, such as Traffic engineering for DBA and Fairness verification for every T-CONT type. Although one or more are specified in each category, all the parameters may not be applied for the system. Operators can select which parameters are applied for DBA management in real service situation.

A.5   Specifications of performance monitoring parameters

There are two categories to manage DBA performance, such as Traffic engineering for DBA and Fairness verification for every T-CONT type. These entities are positioned as history data to report monitoring results in NMS (Network Management System). This clause describes specifications of these entities.

1)   Traffic engineering PM history data

Parameter

#1: The number of received cells except for idle cells at ODN interface in OLT[1] per T-CONT.

#2: The number of assigned grants at the interface per T-CONT.

Definition

The number of receiving cells shows a total number of valid cells in real traffic flow of a T-CONT at ODN interface in OLT. OLT measures the number for a sample interval and calculates a rate according to (the number of receiving cells at ODN interface in OLT)/(the number of issued grants at the interface) for every T-CONT. OLT keeps a maximum value and a minimum value of the rate in a reporting interval, and sends them to EMS with an average value of the rate at the end of the every reporting interval. The lengths of a sample interval and a reporting interval should be determined when OLT is installed.

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[1] See Figure 4/G.983.1.

Example of usage

Operators recognize utilization of a T-CONT by #1/#2. Operators can provision T-CONT parameters according to its T-CONT type. For example, assigned best effort bandwidth in T-CONT Types 4 and 5 can be changed.

Relationship with Management Entities in ITU-T Rec. Q.834.1

This history data is attached to "T-CONT Buffer" in ITU-T Rec. Q.834.1.

2) Fairness verification PM history data

Parameter

#1: Variance (Assigned bandwidth/Actual demanded bandwidth) among T-CONTs for T-CONT Type 2.

#2: Variance (Assigned bandwidth/Actual demanded bandwidth) among T-CONTs for T-CONT Type 3.

#3: Variance (Assigned bandwidth/Actual demanded bandwidth) among T-CONTs for T-CONT Type 4.

#4: Variance ((Assigned bandwidth − Fixed bandwidth)/(Actual demanded bandwidth − Fixed bandwidth)) among T-CONTs for T-CONT Type 5.

NOTE – Variance $(X) = E(X^2) - \{E(X)\}^2$.

Definition

These parameters are used for confirmation of fairness of actual traffic load. Assigned bandwidth means total bandwidth for a T-CONT, that is sum of Fixed bandwidth, Assured bandwidth, Non-assured bandwidth, and Best effort bandwidth. Actual demanded bandwidth means bandwidth that should be assigned for a T-CONT if there is no request from other T-CONTs. In short, it is the ideally assigned bandwidth. It can be derived from reporting value of SR-DBA or from idle cell monitoring for each T-CONT in NSR-DBA.

OLT calculates these variances in every sample period. OLT calculates average of variances calculated by each sample period for a reporting period. It reports this average to EMS at the end of this reporting period. The lengths of a sample interval and a reporting interval should be determined when OLT is installed.

Example of usage

Usually, in the same T-CONT type, this value is small, because surplus bandwidths are equally distributed for each T-CONT in the same T-CONT. If it indicates the large value, operators recognize unfair assignment.

Relationship with Management Entities in ITU-T Rec. Q.834.1

These history data are attached to "TC-Adapter" in ITU-T Rec. Q.834.1.

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