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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,  
DIGITAL SYSTEMS AND NETWORKS

Multimedia Quality of Service and performance – Generic  
and user-related aspects

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### Measurement-based methods for improving the robustness of IPTV performance

Recommendation ITU-T G.1082

ITU-T

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**TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS**

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# **Recommendation ITU-T G.1082**

## **Measurement-based methods for improving the robustness of IPTV performance**

### **Summary**

Recommendation ITU-T G.1082 provides a framework for improving the robustness of IPTV performance based on the results of real-time measurements. The primary application of this framework is to control the media and network resources based on the measurement information and according to policy rules to support high quality of experience of IPTV services.

For IPTV services, service providers and network providers may have separate monitoring systems. Measurement information is provided by the monitoring system. This Recommendation first describes the possible measurement information used in different monitoring domains and the information exchanged between providers. It then gives guidance on how to take these factors into account to adjust media and network resources in order to maintain the quality of experience for IPTV services.

### **Source**

Recommendation ITU-T G.1082 was approved on 29 April 2009 by ITU-T Study Group 12 (2009-2012) under Recommendation ITU-T A.8 procedure.

### **Keywords**

IPTV, measurement, QoE, QoS, resource adjustment.

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# Recommendation ITU-T G.1082

## Measurement-based methods for improving the robustness of IPTV performance

### 1 Scope

This Recommendation describes some methods by which measurement information of IPTV service quality can be used to dynamically control the performance of an IPTV service such as network resource allocation, FEC redundant encoding, delivery path selection or media encoding bit rate if scalable encoding is employed.

This Recommendation defines the subset of QoS/QoE performance parameters to be obtained from the IPTV monitoring system and methods for analysing them to provide media resource and transport network resource control in support of high quality end-to-end delivery of IPTV services.

It also provides guidance on the collaboration between different providers and defines the metrics to be exchanged between them for resource management.

### 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.

- [ITU-T G.1080] Recommendation ITU-T G.1080 (2008), *Quality of experience requirements for IPTV services*.
- [ITU-T G.1081] Recommendation ITU-T G.1081 (2008), *Performance monitoring points for IPTV*.
- [ITU-T Y.1540] Recommendation ITU-T Y.1540 (2007), *Internet protocol data communication service – IP packet transfer and availability performance parameters*.

### 3 Definitions

This Recommendation does not define any special terms.

### 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

|          |                           |
|----------|---------------------------|
| DiffServ | Differentiated Services   |
| FEC      | Forward Error Correction  |
| GOP      | Group Of Pictures         |
| IP       | Internet Protocol         |
| IPDV     | IP packet Delay Variation |
| IPLR     | IP packet Loss Ratio      |
| IPTD     | IP packet Transfer Delay  |

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|       |                                                                            |
|-------|----------------------------------------------------------------------------|
| IPTV  | Internet Protocol Television                                               |
| MMPAP | Monitoring Management and Performance Analysis Platform                    |
| MMRP  | Measurement-based Methods for improving the Robustness of IPTV Performance |
| MOS   | Mean Opinion Score                                                         |
| MPLS  | Multi-Protocol Label Switching                                             |
| NP    | Network Provider                                                           |
| QoE   | Quality of Experience                                                      |
| QoS   | Quality of Service                                                         |
| RFC   | Request For Comments                                                       |
| RTCP  | RTP Control Protocol                                                       |
| RTP   | Real-time Transport Protocol                                               |
| SLA   | Service Level Agreement                                                    |
| SP    | Service Provider                                                           |
| STB   | Set-Top Box                                                                |
| UDP   | User Datagram Protocol                                                     |
| VoD   | Video on Demand                                                            |

## 5 Conventions

None.

## 6 Overview of the framework of measurement-based methods for improving the robustness of IPTV performance (MMRP)

In IPTV services, the QoE is a great concern to the end users. The user expects the perceptual quality of IPTV services to be as good as or even better than that of conventional TV service. In order to achieve the user's expectation, a QoS/QoE monitoring system becomes an indispensable part of the IPTV services.

In a conventional monitoring system, the measurement information is only used for evaluating network performance and QoE of end users. However, this information can also be valuable input for providing media resource and transport network resource control in support of high quality of experience of IPTV services. The SP and NP can adjust the media and network resources based on the measurement information. The resource adjustment procedure includes the steps of reporting measurement information, exchanging information between SP and NP, and deciding resource adjustment methods by SP and NP. Figure 1 depicts a reference model for a MMRP system.

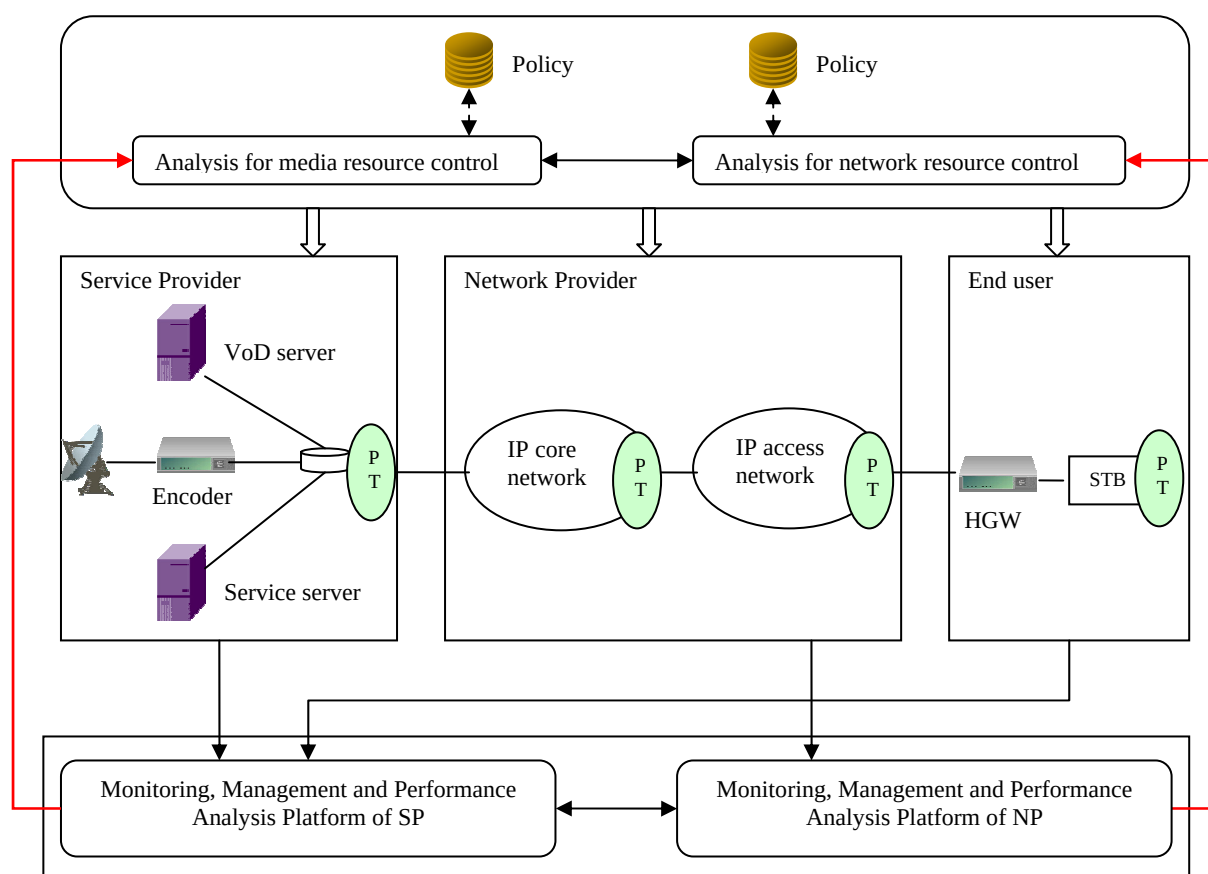


**Figure 1 – Reference model**

A monitoring system includes monitoring points (labelled PTs) and a monitoring, management and performance analysis platform (MMPAP). MMPAP manages one or multiple domains and collects measurement data from the monitoring points. The MMPAP of the SP collects information from the head-end system and the end-user system. The MMPAP of the NP collects information from backbone and access network domains. Note that the monitoring points located in a service provider's domain have different capabilities from those located in a network provider's domain. Based on the measurement data collected from monitoring points, the MMPAP provides the QoE metrics and other information of IPTV services. If the QoE metrics are below a certain predefined value, which is defined in the policy, it may trigger a network resource adjustment procedure, a media resource adjustment procedure or both. Since one single provider has limited measurement information, the SP and NP may share a set of information to decide on a resource adjustment method. During the procedures, the end users may not perceive the quality degradation of IPTV services.

## 7 Process of end-to-end quality improvement

MMPAP is located in the SP and NP administrative areas. The measurement-based resource adaptive control function collects the information from one or more MMPAP. The media and network resource is adjusted in a centralized model or in a distributed model.

### Centralized model

A single resource adaptive control function is responsible for the management of media and network resources. It collects measurement information from all the MMPAPs. If a MMPAP is