

ITU-T 建议书 G.1081

IPTV性能监测点 Performance monitoring points for IPTV

## Summary

Successful deployment of IPTV services requires performance parameters to be monitored at a number of different points in the complete end-to-end chain, including the customer premises, key aggregation points and at interconnect points between disparate and service provider network domains. This Recommendation defines five monitoring points where such performance measurements can be made.

## Keywords

IPTV, performance, QoS, QoE, monitoring points

## 1. 范围 (Scope)

This Recommendation defines performance monitoring points which will allow the service provider/network operator to monitor the performance of the complete IPTV service delivery to the end-user.

Successful deployment of IPTV services requires performance monitoring at the customer premise (e.g. set-top-box), key aggregation points (e.g. DSL Access Multiplexer DSLAM) or cable modem termination system (CMTS) and at interconnect points between disparate network domains and service provider domain boundaries. Performance monitoring can help in:

- Finding errors in an end-to-end system (system debugging)
- Checking the resource utilization and the work load of system components
- Comparing values (metrics) regarding performance of different system deployments
- Providing a base for modelling the system
- Identifying system bottlenecks
- Optimizing IPTV network deployment
- Ensuring that system performance does not degrade with time.

The goal of performance monitoring is to provide end-users of IPTV services with a high user experience by identifying, localizing and quantifying service and network issues.

## 2. 参考 (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 Y.1540] ITU-T Recommendation Y.1540 (2007), "Internet protocol data communication service – IP packet transfer and availability performance parameters," Nov. 2007.

[ITU-T Y.1543] ITU-T Recommendation Y.1543 (2007), "Measurements in IP networks for inter-domain performance assessment," Nov. 2007.

[ITU-T Y.1544] ITU-T Recommendation Y.1544 (2008), "Multicast IP performance parameters," .

## 3. 定义 (Definitions)

Platform A hardware and/or software architecture that serves as a foundation or base for realising a certain functionality.

## 4. 缩写和首字母缩略词 (Abbreviations and acronyms)

本建议使用下列缩略语：

CMTS	Cable Modem Termination System 电缆调制解调器终端系统
DSLAM	DSL Access Multiplexer DSL接入复用器
NMS	NetworkManagement System 网络管理系统
OSS	OperationsSupport System
QoE	Qualityof Experience 体验质量
QoS	Qualityof Service 服务质量
VoD	Videon Demand 视频点播

## 5. 约定 (Conventions)

In this document:

The keyword “ **is recommended** ” indicates a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

The keyword “ **may** ” indicates a requirement which is optional.

## 6. IPTV性能监测点 (IPTV performance monitoring points)

The entire IPTV content delivery chain can be divided into multiple *domains*. Operators at domain borders have the option to perform monitoring which, when taken together, forms an end-to-end monitoring topology.

This domain approach is independent of any specific monitoring method.

Monitored performance characteristics, across a single domain or multiple domains, can be integrated with existing or new operations support systems (OSS) and/or network management system (NMS) systems.

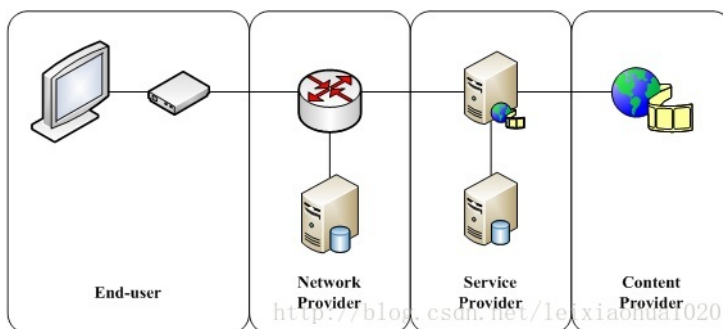


Figure 1/G.1081 – IPTV模型 (IPTV Domains)

The exact topology and domains will vary from one operator to another; however, monitoring can be applied at each domain boundary. An example topology with generalized domain boundaries is shown in Figure 1. These domains are further divided into specific monitoring domains in Figure 2. Within each domain, different aspects can be monitored at each domain boundary as outlined below.

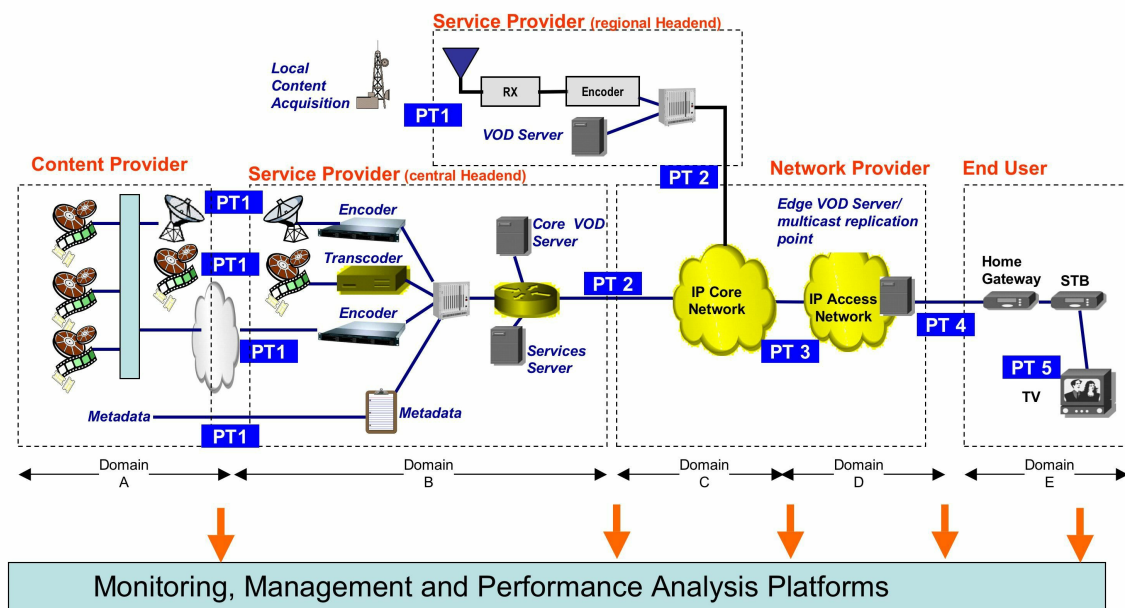


Figure 2/G.1081 – IPTV性能监测点 (IPTV Performance Monitoring Points)

A complete performance monitoring system is recommended to include a performance monitoring management platform to translate the measured data from the monitoring points into actionable knowledge. Functions of the management platform could include data storage, analysis, correlation, fault identification, root cause analysis, report generation and visualization. The range of the management platform(s) may cover all domains as shown in Figure 2.

The interfaces between the performance monitoring management platform(s) and the monitoring points will be further defined in the future.

## 7. 性能监测点定义 (Performance monitoring point definitions)

This section provides a basic description of each monitoring point shown in the previous section. The capabilities and parameters listed below are not an exhaustive list. Some parameters may be difficult to obtain in some scenarios. Conversely, there may be some other parameters that are essential. These are still under study.

### 7.1 监测点1 Monitoring point 1 – PT1

This point demarcates the domain border between content provision and IPTV control. PT1 is located at the domain border between content providers (content owners and aggregators) and IPTV Service provider.

PT1 enables the measurement of source audio-visual quality and metadata verification and the analysis of information to be exchanged between content provider and IPTV service provider.

PT1 may capture the following information:

- Coding parameters of video, audio and text content;
- Quality parameters of video, audio and text content;
- Acknowledgement for the report of source content transfer receipt;

PT1 may support the following capabilities:

- Real-time request/response transactions by the protocols involved;
- Real-time notifications of asynchronous events;
- Reliable and secure delivery of any messages involved;
- Clock synchronization with other monitoring points;
- Identification of various content providers;

- Report testing information for quality parameters of video audio and text content from various content providers to the service quality monitoring platform.

## 7.2 监测点2 Monitoring point 2 – PT2

This point is located at the domain border between the service provider and network provider. It should aim for original streaming quality monitoring. PT2 monitors the service provider stream quality at the head-end egress.

PT2 may capture the following information:

- Quality parameters of stream media from the core node of the service provider;
- Performance parameters of EPG servers at the core node of the service provider;
- Performance parameters of VOD servers at the core node of the service provider;
- Performance parameters of service related servers at the core node of service provider;

PT2 may support the following capabilities:

- Real-time request/response transactions by the protocols involved;
- Real-time notifications of asynchronous events;
- Reliable and secure delivery of any messages involved;
- Clock synchronization with other monitoring points;
- Identification of various servers;
- Report information for quality parameters of video, audio and text content and performance parameters of servers to the service quality monitoring platform.

## 7.3 监测点3 Monitoring point 3 – PT3

This point is located at the boundary between the IP core and IP edge networks for monitoring of IP-related performance parameters. This point can be placed on any type of interface between the IPTV core network and the edge network.

PT3 may capture the following information:

- Source network segment and destination network segment to be measured;
  - IP network performance as defined in [ITU-T Y.1540]. Recommended methods of measurement are found in [ITU-T Y.1543].
- o Mean one-way delay
  - o One-way packet delay variation
  - o Packet loss ratio
  - o Packet loss profile
  - o Path unavailability
- Multicast IP network performance parameters defined in [ITU-T Y.1544].
- o Successful join time
  - o Successful leave time
  - o Group mean one-way delay
  - o Group IP service availability
  - o Mean group loss ratio

PT3 may support the following capabilities:

- Real-time request/response transactions;
- Real-time notifications of asynchronous events;
- Reliable and secure delivery of any messages involved;
- Clock synchronization with other monitoring points;

- Submission of information for quality parameters of IP network to service quality monitoring platform
- Access to raw IP information (e.g., packet headers, type of codec) of the audio-visual or text stream;
- Able to capture information on quality originating from end-user devices.

#### 7.4 监测点4 Monitoring Point 4 – PT4

This point is closest to the user where monitoring the quality of streaming, audio-visual quality, and IPTV service attributes are important. Monitoring at this point can be implemented by introducing the performance monitoring function in Home Gateways and STBs, for example.

PT4 may capture the following information:

- Source network segment and destination network segment to be measured;
- Access the service quality information and stream media quality information of the IPTV service platform from edge point of IPTV;
- Access to raw IP information (e.g., packet headers, type of codec) of the audiovisual or text stream;
- IP network performance parameters defined in [ITU-T Y.1540]. Recommended methods of measurement are found in [ITU-T Y.1543].

- o Mean one-way delay
- o One-way packet delay variation
- o Packet loss ratio
- o Path unavailability
- Multicast IP network performance parameters defined in [ITU-T Y.1544].
- o Successful join time
- o Successful leave time
- o Group mean one-way delay
- o Group IP service availability
- o Mean group loss ratio

PT4 may be able to support the following capabilities:

- Real-time request/response transactions;
- Real-time notifications of asynchronous events;
- Reliable and secure delivery of the messages involved;
- Clock synchronization with other monitoring points;
- Simulate the integrated service flow of IPTV terminal;
- Report information for parameters of IP network performance, service quality that access IPTV service platform from edge point, and stream media quality to service quality monitoring platform.

#### 7.5 监测点5 Monitoring point 5 – PT5

This point is at the final end-point and directly relates to end-user QoE. Monitoring audio-visual quality, text accuracy and IPTV service attributes as perceived by the end-user are important.

PT5 may capture the following information:

- Source network segment and destination network segment to be monitored;
- Access the quality information of service and stream media of the IPTV service platform from the client;

PT5 may support the following capabilities:

- Real-time request/response transactions;
- Real-time notifications of asynchronous events;
- Reliable and secure delivery of any messages involved;
- Clock synchronization with other monitoring points;

- Integrated service information of IPTV terminal;
- Report information for parameters of IP network performance, service quality that access IPTV service platform from client, and stream media quality to service quality monitoring platform.

## 8. 安全性考虑 (Security considerations)

Security aspects have not been addressed in this Recommendation.

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