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INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS  
AND NEXT-GENERATION NETWORKS

Internet protocol aspects – Quality of service and network  
performance

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## Multicast IP performance parameters

Recommendation ITU-T Y.1544

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**GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-  
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# **Recommendation ITU-T Y.1544**

## **Multicast IP performance parameters**

### **Summary**

Recommendation ITU-T Y.1544 extends the framework of Recommendation ITU-T Y.1540 to the point-to-multipoint, or multicast case. It also expands the key Y.1540 concepts with details needed to define parameters for the point-to-multipoint configuration.

The performance of point-to-multipoint packet transfer to a set of destinations can first be considered a set of point-to-point packet transfers, and characterized using any or all of the point-to-point parameters found in Recommendation ITU-T Y.1540. This Recommendation defines parameters that are specific to the point-to-multipoint case.

There are three general categories of point-to-multipoint parameters which focus on different entities in this network topology: parameters that describe the Source performance, parameters that describe the performance at one or more Destinations, and parameters that can be applied to describe the performance of subsections of the multicast tree. In its present version, this Recommendation primarily addresses Destination performance.

This Recommendation also specifies a complete set of parameters for the access and disengagement phases of communication. This aspect goes beyond the scope of Recommendation ITU-T Y.1540, which covers only the information transfer phase.

### **Source**

Recommendation ITU-T Y.1544 was approved on 14 July 2008 by ITU-T Study Group 12 (2005-2008) under Recommendation ITU-T A.8 procedure.

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# Recommendation ITU-T Y.1544

## Multicast IP performance parameters

### 1 Scope

This Recommendation defines parameters that may be used in specifying and assessing the performance of speed, accuracy, dependability, and availability of IP packet transfer of international Internet protocol (IP) data communication services. The parameters apply to point-to-multipoint IP service and to the network portions that provide, or contribute to the provision of, such service in accordance with the normative references specified in clause 2.

In particular, this Recommendation relies on the same layered model and generic performance model defined in [ITU-T Y.1540] for point-to-point communication. The scope of this Recommendation extends [ITU-T Y.1540] to an area that was left for further study: point-to-multipoint communication.

The scope of this Recommendation also includes performance parameters that are relevant to specific multicast protocols. The protocols currently covered are versions 2 and 3 of the Internet group management protocol. Inclusion of these protocols expands beyond the scope of [ITU-T Y.1540] to cover the access and disengagement communication functions.

The operation of multicast routing protocols is evident to users and their hosts, primarily in terms of the network's ability to deliver packets from sources to destinations. This Recommendation does not specify performance parameters for these protocols. Table 1 illustrates the coverage of this Recommendation, in terms of the 3-by-3 matrix (defined in [ITU-T I.350]).

**Table 1 – Partial scope of this Recommendation**

| <b>Function \ Criterion</b> | <b>Speed</b>                                                 | <b>Accuracy</b> | <b>Dependability</b> |
|-----------------------------|--------------------------------------------------------------|-----------------|----------------------|
| Access                      | Multicast group membership performance parameters (clause 8) |                 |                      |
| User information transfer   | Multipoint packet transfer performance parameters (clause 6) |                 |                      |
| Disengagement               | Multicast group membership performance parameters (clause 8) |                 |                      |

As stated above, the topic of availability is also included in the scope of this Recommendation.

The reader of this Recommendation should be familiar with the concepts and definitions of [ITU-T I.350] and [ITU-T Y.1540].

The outline of this Recommendation follows the outline of Y.1540 to the extent possible, in order to simplify references and comparisons. Therefore, the unique multicast access and disengagement material appears near the end of the body of this Recommendation.

### 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 I.350] Recommendation ITU-T I.350 (1993), *General aspects of quality of service and network performance in digital networks, including ISDNs*.  
<<http://web.itu.int/rec/T-REC-I.350/>>
- [ITU-T Y.1540] Recommendation ITU-T Y.1540 (2007), *Internet protocol data communication service – IP packet transfer and availability performance parameters*.  
<<http://web.itu.int/rec/T-REC-Y.1540/>>
- [IETF RFC 3376] IETF RFC 3376 (2002), *Internet Group Management Protocol, Version 3*.  
<<http://www.ietf.org/rfc/rfc3376.txt?number=3376>>
- [IETF RFC 3513] IETF RFC 3513 (2003), *Internet Protocol Version 6 (IPv6) Addressing Architecture*. <<http://www.ietf.org/rfc/rfc3513.txt?number=3513>>

### 3 Abbreviations and definitions

#### 3.1 Abbreviations

This Recommendation uses the following abbreviations:

|             |                                                                 |
|-------------|-----------------------------------------------------------------|
| $A(T_{av})$ | Fraction of destinations in the available state during $T_{av}$ |
| CRE         | Commence Reference Event                                        |
| $E_n$       | Number of errored packet outcomes at destination $n$            |
| EL          | Exchange Link                                                   |
| ER          | Edge Router                                                     |
| $F_n$       | Number of lost spurious outcomes at destination $n$             |
| IGMP        | Internet Group Management Protocol                              |
| IP          | Internet Protocol                                               |
| IPv4        | Internet Protocol Version 4                                     |
| IPv6        | Internet Protocol Version 6                                     |
| IPDR        | IP packet Duplicate Ratio                                       |
| IPDV        | IP packet Delay Variation                                       |
| IPER        | IP packet Error Ratio                                           |
| IPLR        | IP packet Loss Ratio                                            |
| IPOR        | Octet-based IP packet rate                                      |
| IPPR        | IP Packet rate                                                  |
| IPRE        | IP packet transfer Reference Event                              |
| IPRR        | IP packet Reordered Ratio                                       |
| IPSLBR      | IP packet Severe Loss Block Ratio                               |
| IPTD        | IP packet Transfer Delay                                        |
| ISP         | Internet Service Provider                                       |
| JRE         | Join Reference Event                                            |
| $L_n$       | Number of lost packet outcomes at destination $n$               |
| LL          | Lower Layers, protocols and technology supporting the IP layer  |
| LRE         | Leave Reference Event                                           |