



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

E.502

(02/2001)

SERIES E: OVERALL NETWORK OPERATION,
TELEPHONE SERVICE, SERVICE OPERATION AND
HUMAN FACTORS

Traffic engineering – Measurement and recording of traffic

Traffic measurement requirements for digital telecommunication exchanges

ITU-T Recommendation E.502

ITU-T E-SERIES RECOMMENDATIONS
OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

INTERNATIONAL OPERATION

Definitions	E.100–E.103
General provisions concerning Administrations	E.104–E.119
General provisions concerning users	E.120–E.139
Operation of international telephone services	E.140–E.159
Numbering plan of the international telephone service	E.160–E.169
International routing plan	E.170–E.179
Tones in national signalling systems	E.180–E.189
Numbering plan of the international telephone service	E.190–E.199
Maritime mobile service and public land mobile service	E.200–E.229

OPERATIONAL PROVISIONS RELATING TO CHARGING AND ACCOUNTING IN THE INTERNATIONAL TELEPHONE SERVICE

Charging in the international telephone service	E.230–E.249
Measuring and recording call durations for accounting purposes	E.260–E.269

UTILIZATION OF THE INTERNATIONAL TELEPHONE NETWORK FOR NON-TELEPHONY APPLICATIONS

General	E.300–E.319
Phototelegraphy	E.320–E.329
ISDN PROVISIONS CONCERNING USERS	E.330–E.349
INTERNATIONAL ROUTING PLAN	E.350–E.399

NETWORK MANAGEMENT

International service statistics	E.400–E.409
International network management	E.410–E.419
Checking the quality of the international telephone service	E.420–E.489

TRAFFIC ENGINEERING

Measurement and recording of traffic	E.490–E.505
Forecasting of traffic	E.506–E.509
Determination of the number of circuits in manual operation	E.510–E.519
Determination of the number of circuits in automatic and semi-automatic operation	E.520–E.539
Grade of service	E.540–E.599
Definitions	E.600–E.649
Traffic engineering for IP-networks	E.650–E.699
ISDN traffic engineering	E.700–E.749
Mobile network traffic engineering	E.750–E.799

QUALITY OF TELECOMMUNICATION SERVICES: CONCEPTS, MODELS, OBJECTIVES AND DEPENDABILITY PLANNING

Terms and definitions related to the quality of telecommunication services	E.800–E.809
Models for telecommunication services	E.810–E.844
Objectives for quality of service and related concepts of telecommunication services	E.845–E.859
Use of quality of service objectives for planning of telecommunication networks	E.860–E.879
Field data collection and evaluation on the performance of equipment, networks and services	E.880–E.899

For further details, please refer to the list of ITU-T Recommendations.

**Traffic measurement requirements for digital
telecommunication exchanges**

Summary

This Recommendation applies to all digital telecommunications exchanges operating in a switched telephone network and ISDN. Traffic measurements on these exchanges are defined to provide the database from which the dimensioning, planning, operation and management of the network are carried out.

Source

ITU-T Recommendation E.502 was revised by ITU-T Study Group 2 (2001-2004) and approved under the WTSA Resolution 1 procedure on 2 February 2001.

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.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

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.

© ITU 2002

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from ITU.

CONTENTS

	Page
1 Scope.....	1
2 References.....	1
3 Abbreviations.....	2
4 Introduction.....	2
5 Traffic measurement	3
5.1 Traffic measurement model	3
5.2 Traffic measurement structure	4
5.2.1 Measurement set information	4
5.2.2 Time information.....	5
5.2.3 Output routing and scheduling information.....	6
6 Traffic flows	6
7 Basic measurement types.....	8
7.1 General.....	8
7.1.1 Depending on the activities listed in clause 1, a different degree of detail may be needed	8
7.1.2 Network management considerations.....	9
7.1.3 Traffic engineering	9
7.2 Measurements	9
7.2.1 Overall measurements	10
7.2.2 Measurement on selectable objects	12
7.2.3 Measurements on control unit(s).....	13
7.2.4 Measurements on call records	13
7.2.5 Delay grade-of-service (GOS) monitoring.....	14
7.2.6 Network performance monitoring	16
7.2.7 Measurement of the ISDN and its services	17
7.2.8 Measurements for the Intelligent Network (IN)	21
Annexe A	24

ITU-T Recommendation E.502

Traffic measurement requirements for digital telecommunication exchanges

1 Scope

This Recommendation defines the traffic measurements generated by digital telecommunications exchanges operating in a switched telephone network and ISDN. A generic traffic measurement model is established, based on the definition of the entities to be measured and the objects on which the measurements are performed, and the different traffic flows occurring in the exchange are identified.

Measurements are defined at different functional levels: overall measurements, measurements on selectable objects, measurements on services, measurements on control units, measurements on call records and delay GOS measurements. Services for which measurements are defined are the basic telephone service, ISDN services and IN services.

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 use of the analysed results will be dependent on the procedures in each Administration. The list of Recommendations below are those currently existing and covering many operational aspects. They are offered only as a guide rather than as a comprehensive and complete set.

- ITU-T E.175 (1988), *Models for international network planning*.
- ITU-T E.41x series of Recommendations, *International network management*.
- ITU-T E.42x series of Recommendations, *Checking the quality of the international telephone service*.
- ITU-T E.491 (1997), *Traffic measurement by destination*.
- ITU-T E.492 (1996), *Traffic reference period*.
- ITU-T E.493 (1996), *Grade of service (GOS) monitoring*.
- ITU-T E.500 (1998), *Traffic intensity measurement principles*.
- ITU-T E.503 (1992), *Traffic measurement data analysis*.
- ITU-T E.504 (1988), *Traffic measurement administration*.
- ITU-T E.505 (1992), *Measurements of the performance of common channel signalling network*.
- ITU-T E.506 (1992), *Forecasting international traffic*.
- ITU-T E.543 (1988), *Grades of service in digital international telephone exchanges*.
- ITU-T E.721 (1999), *Network grade of service parameters and target values for circuit-switched services in the evolving ISDN*.

- ITU-T M-series Recommendations, *TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits.*
- ITU-T O-series Recommendations, *Specifications of measuring equipment.*
- ITU-T Q-series Recommendations, *Switching and signalling.*
- ITU-T Q.544 (1988), *Digital exchange measurements.*

3 Abbreviations

This Recommendation uses the following abbreviations:

GOS	Grade of Service
IN	Intelligent Network
ISDN	Integrated Services Digital Network
OS	Operations System
SCP	Service Control Point
SRP	Specialized Resource Point (formerly Intelligent Peripheral – IP)
SSP	Service Switching Point

4 Introduction

This Recommendation applies to all digital telecommunications exchanges operating in a switched telephone network and ISDN.

Traffic measurements on exchanges and surrounding network provide the database from which the dimensioning, planning, operation and management of the network are carried out.

Information gathered from these measurements can be used for:

- identifying traffic patterns and distributions on a route and destination basis;
- determining the amount of traffic in the exchange and the network;
- monitoring the continuity of service and the grade of service.

The above data and information are gathered with the purpose of supporting the following fundamental activities:

- a) dimensioning, planning and administration of the exchange and surrounding network;
- b) performance monitoring of the exchange and surrounding network;
- c) network management;
- d) operation and maintenance of the exchange and surrounding network;
- e) tariff and marketing studies;
- f) forecasting;

The information generated by the exchange (see ITU-T Q.544) can be provided to the end user in either real time or non-real time (post processed). The activities being performed by the end user will dictate the speed of this response: for example, operation and maintenance will require real-time information while the forecasting and planning information can be provided after the event in non-real time.

For these activities, the following major processing steps can be identified:

- generation, collection and storage of data;
- analysis and processing of data;
- presentation and use of the analysis results.

The generation, collection and output of raw data is achieved by continuous as well as periodic and non-periodic measurements carried out in the exchange.

The data analysis may be performed by the exchange itself or by another system depending on the following:

- total amount of data;
- need for analysis of data from multiple exchange;
- processor load constraints.

For further information, see ITU-T E.503.

5 Traffic measurement

5.1 Traffic measurement model

This clause establishes the basic structure for a traffic measurement model that can be applied to measurements of traffic generated by the telephony service and ISDN.

A measurement is identified by three basic elements: time, entities, objects. Time includes all the necessary information to define the start, the duration and periodicity of a certain measurement. Entities describe the quantities for which data collection must be performed with a certain measurement. Objects are individual items on which the measurements are performed. Some examples of entities and objects are given below:

Entities:

- traffic volume;
- number of call attempts;
- number of seizures;
- number of successful call attempts;
- number of call attempts for which a delay exceeds a predetermined threshold value.

Objects:

- subscriber line groups;
- circuit groups;
- common control units;
- auxiliary devices;
- destinations;
- common channel signalling links;
- signal transfer points (STP);
- common channel signalling points;
- common channel user/application part.

The measurements are classified into different measurement types on the basis of a measurement matrix in which each row represents an entity and each column represents an object (see Figure 1).

5.2.2 Time information

Measurements may have an undetermined duration (stop date is not pre-specified), or a predetermined duration, or be taken all the time. In addition, measurements may be performed continuously or on a non-continuous basis.

For measurements of undetermined duration and performed non-continuously, the recording days must be determined on a periodic basis (periodicity pattern within a calendar week). For measurements of predetermined duration, the recording days may be determined on a periodic basis or by defining the dates of the recording days (see Figure 2).

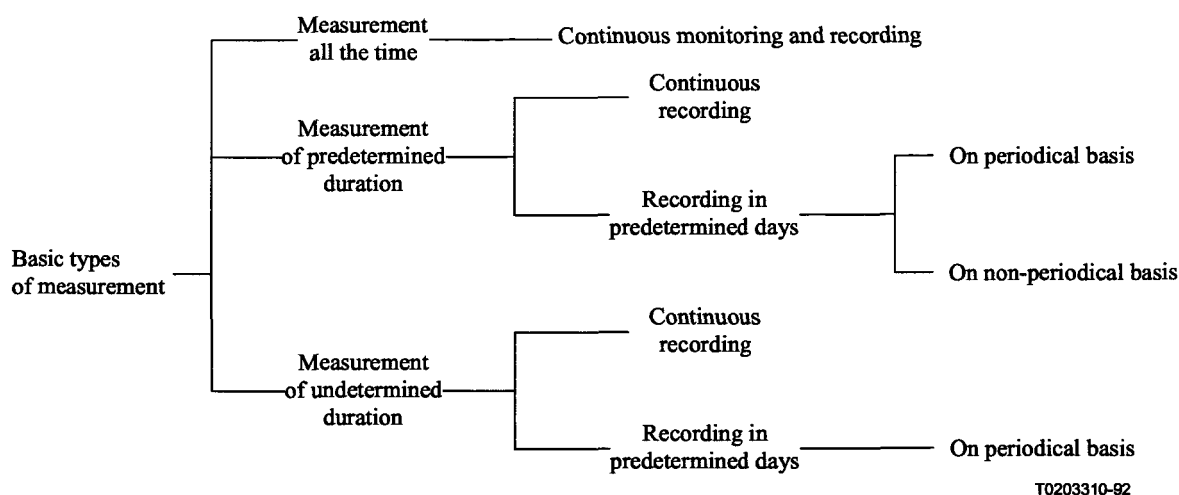


Figure 2/E.502

As shown in Figure 3, time data are measurement level, recording day level and recording period level.

Measurement level: Contains information about dates of recording days for non-periodic measurements or periodicity pattern for periodic measurements.

Recording day level: Contains information about the start and stop time for recording periods within a recording day.

Recording period level: Contains information about the periodicity of the data collection, controlled by the result accumulation period. The result accumulation period can be shorter than the recording period; in that case, more than one set of data is collected for each of the recording periods, to be routed toward the output media according to the results output schedule.