INTERNATIONAL TELECOMMUNICATION UNION

CCITT E.503 (rev.1)

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

TELEPHONE NETWORK AND ISDN

QUALITY OF SERVICE, NETWORK MANAGEMENT AND TRAFFIC ENGINEERING

TRAFFIC MEASUREMENT DATA ANALYSIS

Recommendation E.503 (rev.1)

Geneva, 1992

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation E.503 was prepared by Study Group II and was approved under the Resolution No. 2 procedure on the 16th of June 1992.

CCITT NOTE

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

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Recommendation E.503

TRAFFIC MEASUREMENT DATA ANALYSIS

(revised 1992)

1 Introduction

The aim of traffic measurements is to provide data that can be used by an Administration for planning, engineering and managing its network. The resulting measured data can be used to support various activities as stated in Recommendation E.502. In order to reduce the amount of data transfer and off-line processing, the exchange or operations system can be used to make preliminary analyses for purposes of:

– eliminating unnecessary data values;

– replacing missing or wrong values in an approriate way;

– performing simple calculations on the values of the basic measurement entities to derive characteristic parameter values of the traffic;

– storing some measured or calculated values, in particular, traffic data records;

– producing appropriate user friendly report printouts.

For each measurement object, there is a data record in which a certain number of traffic values are stored. Also, some calculated values, e.g. moving average, can be stored and updated in this data record area.

The internal functions of the analysis are not specified here. They depend on the requirements for the output results which are specified by the Administration. An acceptable method may be to collect and store the data in real time, either in a temporary data base file or directly in the traffic data record, and later perform the calculations and report printout during periods of low exchange processing activity. Alternatively, the records can be transferred to an off-line system for processing, to reduce the load on the exchange.

2 Potential applications

In order to provide bulk data for traffic and operational analysis, overall measurements can be performed on the totality of subscriber lines and/or circuits.

More specific information on traffic data relevant to the exchange and surrounding network performance can be provided by means of measurements on selected sets of circuit groups, subscriber line groups, common channel signalling links, auxiliary and control units.

Very detailed traffic data can be obtained by analysis of call records. These call records should be produced by the exchange, containing all the data (e.g. time of occurrence of signalling event, dialled digits, etc.) characterizing each individual call attempt.

The relationships between the above measurements and the potential applications are shown in Table 1/E.503. The basic measurement types are given in Recommendation E.502. Their applicability will depend on the function of the exchange (local, transit, international, etc.).

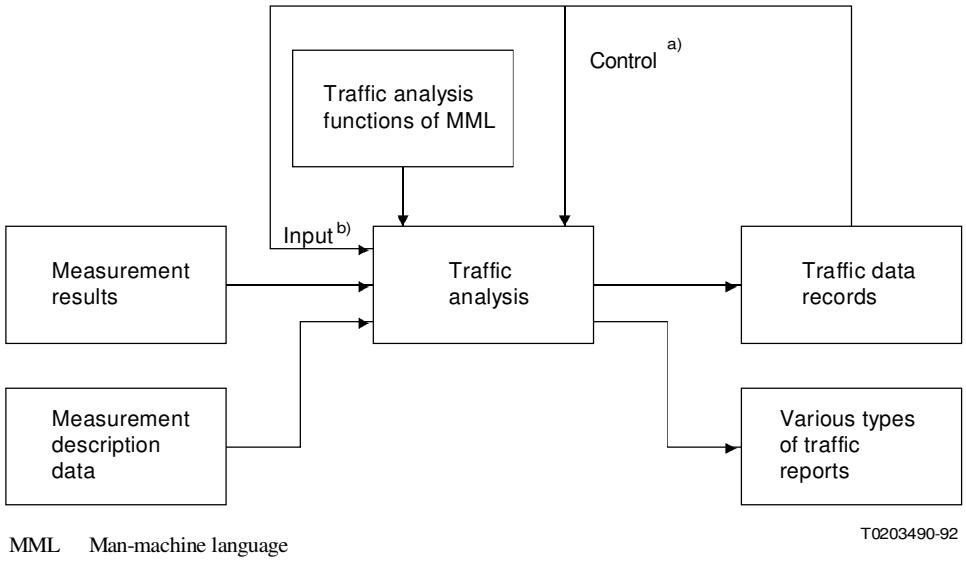
TABLE 1/E.503

Potential applications / Measurements basis	Exchange dimensioning, planning and administration	Network dimensioning, planning and administration	Exchange performance monitoring	Network performance monitoring	Support to maintenance	Network management	Tariff and marketing studies
Overall traffic	X	X	X	X	X	X	
Circuit groups	X	X	X	X	X	X	
Subscriber line groups	X	X					
Auxiliary units	X	X	X				
Control units	X	X	X	X			
Common channel signalling	X	X	X	X	X	X	
Call records	X	X	X	X	X	X	X

3 Traffic analysis model

Corresponding to a variety of measurements, there are a variety of analyses, some of which are typically running continuously from day to day. From the viewpoint of a particular measurement, there are one or more analyses for which the measured data are written in particular files which are included in the output device list of a measurement as logical devices. These files are input files from the viewpoint of a traffic analysis and the process can be regarded as a transformation of the measurement entities into desired output information to the traffic analyst to aid in making various decisions.

For example, various criteria for dimensioning and verification of the grade of service could be produced by one or more analyses. A schematic picture of the flow of information is presented in Figure 1/E.503 as an activity diagram.



MML Man-machine language

a) The traffic values in the data record may have an effect on the internal functional steps.

b) There is a traffic data record for each individual measurement object which is included in the analysis. The past traffic values, and also calculated values, are used as input when updating the contents of the record at the time of a new traffic value.

FIGURE 1/E.503

Activity diagram of the information flows associated with traffic analysis

The following information is associated to each traffic analysis:

– identities of the related measurements,

– parameter values which are user-selectable to define the desired option or mode of the analysis,

– report dates of such report types for which the user must define the printout schedule,

– output devices for all report types.

4 Traffic analysis administration

4.1 In order to administer traffic analysis, the operator should perform a series of related activities and the system should support such activities by suitable system functions. Details are given below.

4.2 *List of tasks*

The following list of tasks is not intended to be complete; it aims to cover the operator's main activities in the area of traffic analysis administration:

a) to define parameter values in the parameter list of the analysis and to modify old values;

b) to define report dates for each type of report in a report date list as required and to modify it;

c) to define output routing for each type of report by an output routing list, as required, and to modify the dates;

d) to activate and/or deactivate the performance of the analysis;

e) to retrieve different kinds of information related to the existing traffic analysis;

f) to administer traffic data records of the measurement object which are included in the analysis.

4.3 *List of system functions*

The system should offer the following functions to support the jobs of the operator and the analysis itself:

a) transfer of the measured data to the analysis;

b) scheduling of various functions within the analysis, e.g. end-of-day calculation, report printout on report dates, etc.;

c) management of traffic data records;

d) management of analysis description data;

e) transfer of the identification and capacity information of the measurement object to the analysis, e.g. title of a circuit group and the number of circuits assigned to it[1)];

f) management of the printout of reports;

g) supervision control on the time delay of the various operations associated with the analysis.

4.4 *List of man-machine language (MML) functions*

Only a preliminary list of MML functions is presented below, and the complete specifications of such functions will appear in the Z-Series Recommendations:

– define analysis parameters;

– define a report date list;

– define an output routing list;

– administer traffic data records;

– activate a traffic analysis;

– deactivate a traffic analysis;

– interrogate a traffic analysis;

– interrogate a traffic analysis versus measurements;

– interrogate an output routing list;

– interrogate analysis parameters;

– interrogate a report date list.

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1) All this information may or may not be available in the collection of the measured data.

5 Traffic analysis for special situations

5.1 *Multi-ISC operation*

Many Administrations may choose to operate two (or more) international switching centres (ISCs) in a configuration where the ISCs each have access to some of the circuits to a destination. Each ISC, in turn, directs overflow traffic from its circuits to the destination to the other ISC via an inter-exchange circuit group. Such overflow traffic, of course, is not permitted to again overflow back to the original exchange, thereby preventing circular routings on the inter-exchange route. Figure 2/E.503 is a simple example of such an arrangement. With such a configuration, measurements of bids to a destination become inflated, since more than one bid may be recorded for a specific call attempt to a destination, and it is difficult to measure true overflow counts (that is, calls that are actually blocked) since an overflowed call may be successful in the other exchange. To resolve this problem, the following calculations may be made:

5.1.1 *True bids*

True bids to destination = Bids B $\rightarrow$ X + Bids A $\rightarrow$ X – Seizures at A on A-B route – Seizures at B on B-A route

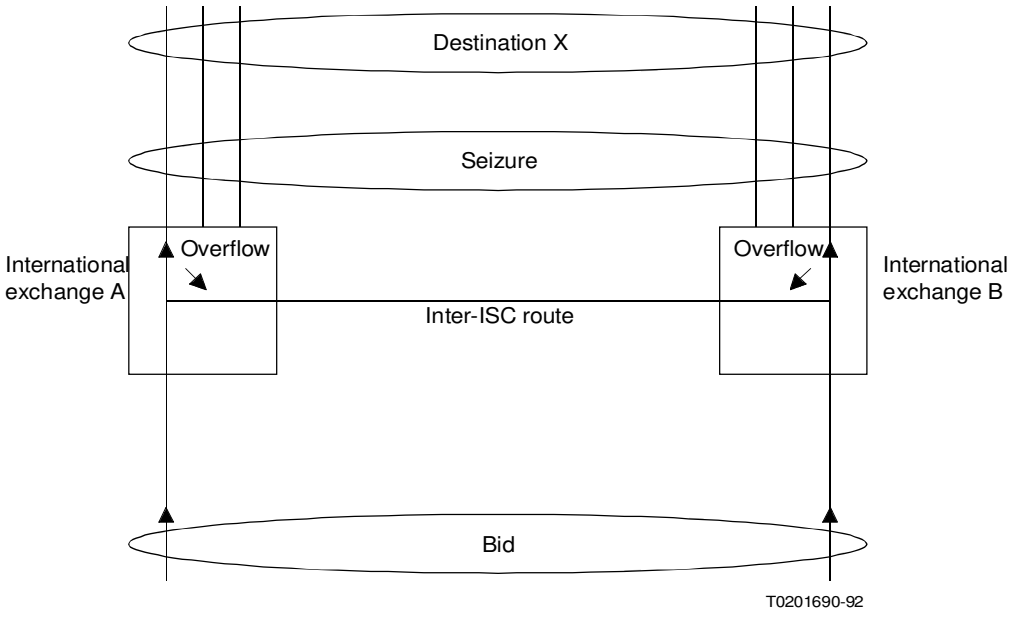

FIGURE 2/E.503

Example of multi-ISC operation

5.1.2 *True overflow*

True overflow to destination = Bids blocked at A + Bids blocked at B

Bids blocked at A = Bids originating at A which are blocked on the inter-exchange route to B + Bids from B which overflow the circuit group to the destination X at A.

Bids blocked at B = Bids originating at B which are blocked on the inter-exchange route to A + Bids from A which overflow the circuit group to the destination X at B.

The calculation of true bid and overflow requires estimation-specific measurements and the combination of measurements from several ISCs, possibly in separate locations. It is recommended that this calculation be done in operation support system and in near real time if practical. Where near real time calculation is not possible, real time measurements of apparent bids and overflow at the individual ISCs, should be retained for other applications.