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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

SERVICE CAPABILITIES

COMMON SPECIFIC CHARACTERISTICS OF SERVICES

ITU-T Recommendation I.221

(Previously “CCITT Recommendation”)

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The 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 Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation I.221 was revised by the ITU-T Study Group XVIII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

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

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INTRODUCTION

The principles of telecommunication services supported by an ISDN and the means to describe them are given in Recommendation I.210.

The attribute technique and values of attributes, which form part of the standardized description method, (see Recommendation I.130) for services, are given in Recommendation I.140.

This Recommendation refers to and details the common specific characteristics of services for both basic services and supplementary services.

COMMON SPECIFIC CHARACTERISTICS OF SERVICES

(Melbourne, 1988, amended at Helsinki, 1993)

1 Scope and content of the Recommendation

This Recommendation identifies and describes those common specific characteristics of services which are a common feature of each of the individual services and which help to form a relationship between services.

These characteristics are used in a consistent manner throughout the ISDN services and are intended to be service independent. They are used, for instance, to help to identify the situations under which certain supplementary services are invoked during the operation of basic services.

2 Common specific characteristics

2.1 Definition of "busy" in an ISDN

2.1.1 Scope

This clause describes the conditions under which a given ISDN destination is considered "busy". In general, this occurs whenever the resources associated with that destination (and needed to successfully complete the call) exist but are not available for the call. In existing networks, such as the PSTN, this is indicated to the calling subscriber by "busy tone".

In addition, the operation of certain ISDN supplementary services occurs when certain of these resources are busy. Therefore, these "resource busy" conditions are also described herein.

This clause does not cover the cases where network resources not associated with a given destination are unavailable, or when such resources are out-of-service or otherwise non-functional.

2.1.2 Resources

Two main categories of resources may become involved in the determination of "busy": interface resources and customer resources.

Interface resources include the signalling channel (D-channel), other physical channels (B- and H-channels), logical channels (for packet-mode services) and maximum number of calls supported. It is noted that with the ongoing activities on "calls versus connections" other interface resources may become important in the future.

For the purposes of this Recommendation, the signalling channel is considered to be always available and with sufficient capacity to handle signalling for new calls. Situations where this is not true are considered to be "failure conditions" and are not covered here. For the other interface resources, descriptions are given below of what is meant when they are considered busy.

Subscriber resources include the terminal(s) themselves and the persons or processes using them. For the purposes of this Recommendation, it is not considered significant which of the subscriber resources are busy, or why. An indication from the subscriber that (some, necessary) subscriber resources are busy is sufficient.

2.1.3 Resource busy conditions

Three resource busy conditions have been found necessary to refer to, and are defined below:

1) *Channels busy* – This condition occurs when there is no appropriate information channel (physical or logical) available for the network to use for the call. It may be due to exceeding the information channel limit associated with the service or with the interface.

2) *Maximum number of total calls reached* – This condition occurs when the maximum number of total calls supported, either at the given subscriber's interface(s) or for a given service, has been reached.

3) *Subscriber busy* – This condition is indicated by the subscriber's terminal equipment, e.g. by having all compatible terminals which could respond to the call request indicate "user busy" either, when they are offered a call, or, in response to an enquiry from the network.

2.1.4 Procedural aspects

The resource busy conditions described above significantly influence the call offering procedures, both for the basic ISDN calls and for calls that may involve ISDN supplementary services. The procedural aspects of call offering are outlined below and shown in Figure 1.

1) Assume that a call of a telecommunications service subscribed to by the called subscriber is about to be offered.

2) If all of the appropriate user-network interface information channels are busy (i.e. channels busy) and either the network does not support the offering of additional calls beyond the number of appropriate channels, or the maximum number of such additional calls has been reached, the network will clear the call [see also item 7), below] and indicate "network determined user busy" back towards the calling subscriber.

3) Similarly, if the maximum number of total calls supported at the given subscriber's interface(s) has been reached, the network will clear the call [see also item 7, below] and indicate "network determined user busy" back towards the calling subscriber.

4) Otherwise, the network offers the call to the subscriber.

5) If any compatible terminal responds "positively" to the call offering, i.e. gives some indication that the call may progress towards successful completion, the normal call offering procedure should continue.

6) If no compatible terminal responds "positively" but one or more compatible terminal responds "user busy", then when the response-to-call-offering timeout occurs, the network will clear the call with the indication "user determined user busy".

7) It is recognized that for the determination of a "network determined user busy" condition, the network does not have complete knowledge of whether or not a compatible terminal exists at the called interface. However, if NDUB is returned, the caller knows that the basic service is subscribed to at the destination, hence it is likely that compatible terminals exist. This may still mask the exact determination of a "no compatible terminal available" condition, i.e. a NDUB condition may be returned when, in fact, no compatible terminal is connected if for some reason, the destination subscribes to the basic service but has no terminals compatible with the basic service connected or if there is some other incompatibility. The use of an explicit compatibility check to prevent this (i.e. return of the NDUB condition when no compatible terminal is connected) from occurring is a service provider option and is for further study.

2.1.5 Definition of busy

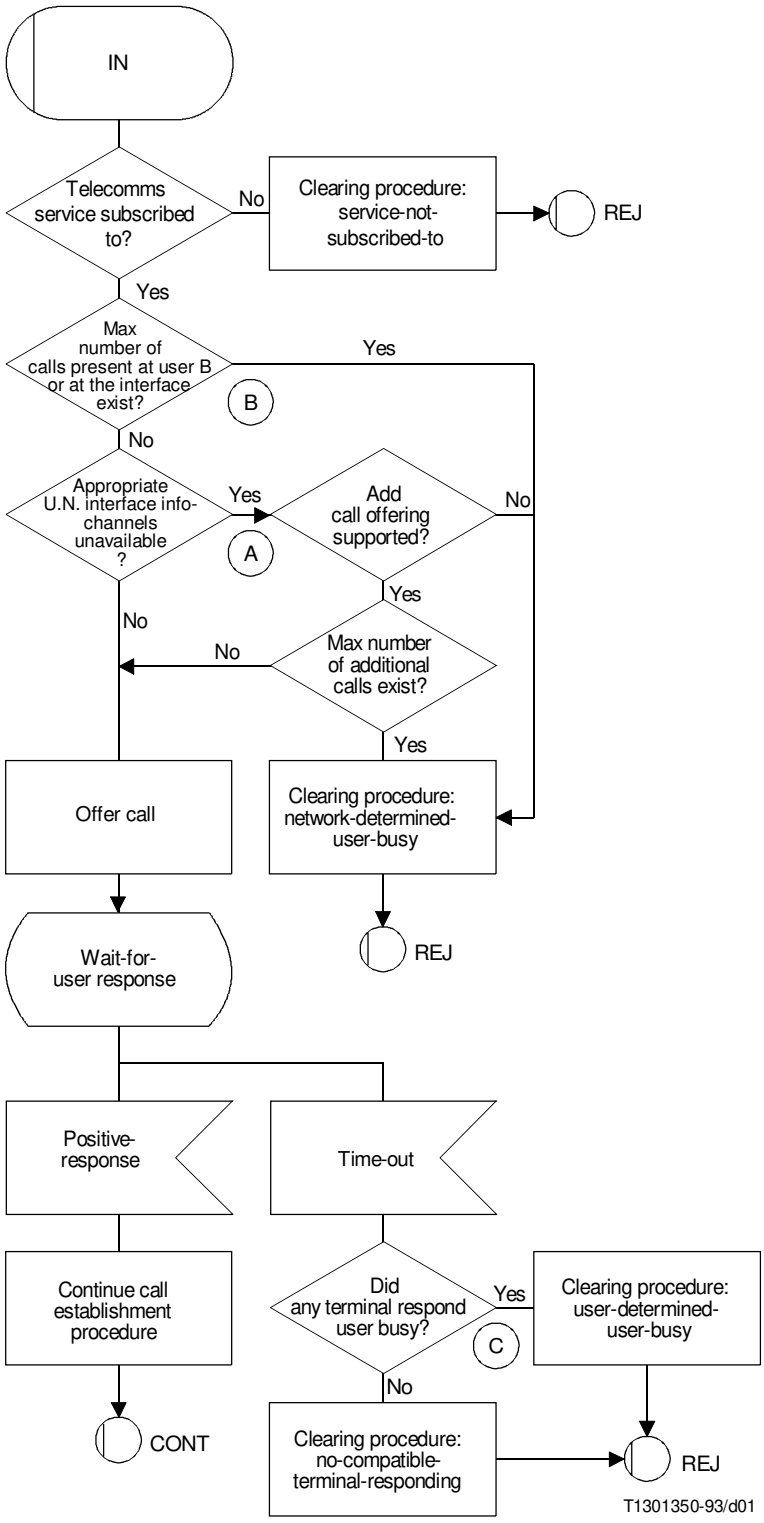
An ISDN destination is considered to be busy if either a "network determined user busy" or a "user determined user busy" condition occurs, as described above.

2.1.6 Interface parameters

The following subscription options are applicable to the interface as a whole regardless of service:

Subscription options	*Value*
Maximum number of information channels on the interface	C
Maximum number of calls present on the interface	K

These subscription parameters for the interface are expected to be negotiated and set at the time the user interface is provisioned. The parameters represent upper limits that cannot be exceeded when channels/calls are being assigned for determining busy condition (see Figure 1).



NOTES

1 This figure illustrates the procedural aspects and the situations which give rise to a clearing procedure containing user busy information. It does not attempt to define any signalling protocol or the design of a network.

2 Points Ⓐ, Ⓑ and Ⓒ have been identified to assist in the description of ISDN supplementary services.

3 The capability to support additional call offerings and the determination of the maximum number of such additional calls, may involve the use of a supplementary service, e.g. call waiting.

FIGURE 1/I.221

Macro definition – Busy-in-an-ISDN

Annex A

(to Recommendation I.221)

Handling of active and held calls

(This annex forms an integral part of this Recommendation)

A.1 Introduction

This text describes the handling functions available to the user when the user has more than one call. This situation can arise when the user invokes the Call Hold supplementary service in order to temporarily break the communication on one call and then establish communication with another user, by making another call, answering a waiting call, or retrieving a previously held call.

In addition, the user can invoke some supplementary services, e.g. Explicit Call Transfer, which can involve an active and a held call in the supplementary service. The procedures for such supplementary services are contained within the standards for those supplementary services.

The following subclause describe the functions available to users having more than one call in progress.

A.2 Functionality available to the served user controlling more than one call

The served user A, who has at least one call on hold and one active call can:

i) switch from one call to another call as required (possibly several times), privacy being provided between the calls.

NOTE – There may exist a terminal function which performs the "alternate-procedure" (i.e. sequential HOLD and RETRIEVE functions) as described above.

ii) disconnect the active party, the other parties are still held;

iii) disconnect one of the held parties;

iv) establish another call (having first put the active call on hold). When the served user is in control of only held calls the user can establish a further call;

v) request the service provider to connect two users (Explicit Call Transfer);

vi) request the service provider to begin a three-way conversation. The served user can invoke this step only after the call to one party has reached the active state and at least one call is on hold;

vii) request the service provider to begin the Conference Call, add on supplementary service, including the active call in the conference.