INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

X.96

(03/00)

SERIES X: DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

Public data networks – Network aspects

Call progress signals in public data networks

ITU-T Recommendation X.96

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION X.96

CALL PROGRESS SIGNALS IN PUBLIC DATA NETWORKS

Summary

This Recommendation identifies and categorizes call progress signals used in public data networks. This revision slightly restructures the text and adds call progress signals for frame relay data networks. Call progress signals for circuit switching are not changed and call progress signals for packet switching are slightly corrected.

Source

ITU-T Recommendation X.96 was revised by ITU-T Study Group 7 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 31 March 2000.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. 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, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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.

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As of the date of approval of this Recommendation, the 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.

CONTENTS

CALL PROGRESS SIGNALS IN PUBLIC DATA NETWORKS

(Geneva, 1976; amended at Geneva, 1980 and Malaga-Torremolinos, 1984, Melbourne, 1988 and Helsinki, 1993 and Geneva, 2000)

1 Introduction

The establishment in various countries of public data networks for data transmission creates a need to inform the caller about the progress of the call. This Recommendation lays down the call progress signals in public data networks indicating the circumstances which have prevented the connection being established to a called user.

2 Scope

This Recommendation describes the call progress signals in circuit switched, packet switched and frame-relay data networks. Besides of informing of the caller about the reasons that have prevented the establishing of the call and also about the progress made toward establishing the call, call progress signals in some cases inform the users about network congestion which may impact on data integrity. Call progress signals may be transmitted to calling and called DTE when call is reset or cleared as a cause of the reset or the clearing.

3 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; all 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.

[1] ITU-T Recommendation X.2 (2000), *International data transmission services and optional user facilities in public data networks and ISDNs.*

[2] ITU-T Recommendation X.7 (2000), *Technical characteristics of data transmission services.*

[3] ITU-T Recommendation X.20 (1988), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for start-stop transmission services on public data networks.*

[4] ITU-T Recommendation X.20 *bis* (1988), *Use on public data networks of Data Terminal Equipment (DTE) which is designed for interfacing to asynchronous duplex V-series modems.*

[5] CCITT Recommendation X.21 (1992), *Interface between Data Terminal Equipment and Data Circuit-terminating equipment for synchronous operation on public networks.*

[6] ITU-T Recommendation X.21 *bis* (1988), *Use on public data networks of Data Terminal Equipment (DTE) which is designed for interfacing to synchronous duplex V-series modems.*

[7] ITU-T Recommendation X.25 (1996), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit.*

[8] ITU-T Recommendation X.28 (1997), *DTE/DCE interface for start-stop mode Data Terminal Equipment accessing the packet assembly/disassembly facility (PAD) in a public data network situated in the same country.*

[9] ITU-T Recommendation X.32 (1996), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and accessing a packet switching public data network through a public switched telephone network or an integrated services digital network or a circuit switched public data network.*

[10] ITU-T Recommendation X.36 (2000), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for public data networks providing frame relay data transmission service by dedicated circuit.*

4 Abbreviations

This Recommendation uses the following abbreviations:

DCE Data Circuit-terminating Equipment

DSE Data Switching Exchange

DTE Data Terminal Equipment

PVC Permanent Virtual Circuit

ROA Recognized Operating Agency

SVC Switched Virtual Circuit

VC Virtual Circuit

5 General description

The call progress signals and their related circumstances giving rise to them are defined in Table 1.

Call progress signal format and coding shall be in accordance with relevant interface specifications in the X-series Recommendations.

In a circuit-switched service, call progress signals may only be transmitted during the call set-up phase. In a packet-switched service and frame-relay service they may also be transmitted during the data transfer phase and the call clearing phase of a virtual call.

The call progress signals are categorized according to their significance to the network or DTE and the type of action expected of the DTE receiving the signal, refer to Table 2.

The sequence of call progress signals in Table 1 implies, for categories C and D, the order of call set-up processing by the network. In general the DTE can assume, on receiving a call progress signal, that no condition higher up the table is present. *Network congestion*, *network out-of-order*, *long-term network congestion* and *no connection* are exceptions to this general rule. The actual coding of call progress signals does not necessarily reflect this sequence.

Except as noted in Note 4 to Table 1, all call progress signals will be extended to the DTE unmodified. Users and DTE manufacturers are warned to make due allowance for possible later extensions to this table by providing appropriate fall-back routines for unexpected signals.

Table 1/X.96

Call progress signal	Definition	Category	Applicable to					See Note
			Circuit switching	Packet switching		Frame relay		
				VC	PVC	SVC	PVC	
Terminal called	The incoming call was signalled to the DTE and call acceptance is awaited.	A	(M)	–	–	–	–	1
Redirected call	The call has been redirected to another number assigned by the originally called subscriber, because, for example, it was busy.	A	(M)	(M)	–	FS	–	
Connect when free	The called number is busy and the call has been placed in a queue. The call will be connected when the called number becomes free if the caller waits.	A	(M)	–	–	–	–	
Registration/cancellation confirmed	The facility registration or cancellation requested by the calling DTE has been confirmed by the network.	B	(M)	–	–	–	–	
Redirection facility active	The redirection facility is active.	B	(M)	–	–	–	–	2
Redirection facility not active	The redirection facility is not active.	B	(M)	–	–	–	–	2
No connection	Cause unspecified.	C1	M	–	–	–	–	
Selection signal transmission error	A transmission error has been detected in the selection signals by the first Data Switching Exchange (DSE).	C2	M	–	–	–	–	

Table 1/X.96 (*cont.*)

Call progress signal	Definition	Category	Applicable to					See Note
			Circuit switching	Packet switching		Frame relay		
				VC	PVC	SVC	PVC	
Local procedure error	A procedure error caused by the DTE is detected by the DCE at the local DTE/DCE interface. Possible reasons are indicated in relevant X-series Recommendations on interfaces (e.g. incorrect format, expiration of a time-out).	D1	M	M	M	M	M	3
Network congestion	A condition exists in the network such as: 1) temporary network congestion, 2) temporary fault condition within the network, including procedure error within a network or an international link.	C2	M	M	M	M	M	
Network out of order	Temporary inability in the network to handle data traffic.	C2	–	–	M	–	–	
No circuit/ channel available	Network has no appropriate circuit / channel presently available to handle the call.	C2	–	–	–	M	–	17
Invalid facility request	A facility requested by the calling DTE (circuit switching, packet switching or frame-relay services) or the called DTE (packet switching service only) is detected as invalid by the DCE at the local DTE/DCE interface. Possible reasons include: • request for a facility which has not been subscribed to by the DTE; • request for a facility which is not available in the local network; • request for a facility which has not been recognized as valid by the local DCE.	D1	M	M	–	(M)	–	18

Table 1/X.96 (*cont.*)

Call progress signal	Definition	Category	Applicable to					See Note
			Circuit switching	Packet switching		Frame relay		
				VC	PVC	SVC	PVC	
Facility rejected	Facility requested by the calling DTE cannot be provided by the network.	D1	–	–	–	(M)	–	19
ROA out of order	The ROA nominated by the calling DTE is unable to forward the call.	D2	(M)	(M)	–	–	–	4
Changed number	The called DTE has been assigned a new number.	D1	M	–	–	–	–	
Not obtainable	The called DTE address is out of the numbering plan or not assigned to any DTE.	D1	M	M	–	M	–	
Access barred	The calling DTE is not permitted for the connection to the called DTE. Possible reasons include: • unauthorised access between the calling DTE and the called DTE; • incompatible closed user group.	D1	M	M	–	(M)	–	
No response	Called DTE does not respond within the prescribed period of time.	D1	–	–	–	M	–	
Reverse charging acceptance not subscribed	The called DTE has not subscribed to the reverse charging acceptance facility.	D1	FS	(M)	–	(M)	–	16
Incompatible user class of service	The called DTE belongs to a user class of service which is incompatible with that of the calling DTE.	D1	M	–	–	–	–	5
Fast select acceptance not subscribed	The called DTE has not subscribed to the fast select acceptance facility.	D1	–	(M)	–	–	–	
Incompatible destination	The remote DTE/DCE interface or a transit network does not support a function or facility requested.	D1	–	M	M	–	–	
Ship absent	The called ship is absent.	D1	–	M	–	–	–	12

Table 1/X.96 (*cont.*)

Call progress signal	Definition	Category	Applicable to					See Note
			Circuit switching	Packet switching		Frame relay		
				VC	PVC	SVC	PVC	
Transit network inaccessible	Frame-relay network cannot route the call through the transit network specified by the calling DTE.	D2	–	–	–	(M)	–	15
Out of order	The remote number is out of order. Possible reasons include: 1) DTE is uncontrolled not ready; 2) DCE power off; 3) network fault in the local loop; 4) in packet switched services only: • X.25 layer 1 not functioning; • X.25 layer 2 not in operation.	D1 or D2	(See Note 6)	M	M	M	M	8
Network fault in the local loop	The local loop associated with the called DCE is faulty.	D2	M (See Note 20)	(See Note 7)		(See Note 7)		9
DCE power off	Called DCE has no mains power or is switched off.	D1	M (See Note 20)	(See Note 7)		FS	FS	9
Uncontrolled not ready	Called DTE is uncontrolled not ready.	D1	M (See Note 20)	(See Note 7)		FS	FS	9
Controlled not ready	Called DTE is signalling controlled not ready.	D1	M	FS	FS	FS	FS	1
Number busy	The called DTE is detected by the DCE as engaged on other call(s), and therefore as not being able to accept the incoming call.	C1	M	M	–	M	–	
Call the information service	The called number is temporarily unobtainable. Call the network information service for details.	D1	M	–	–	–	–	

Table 1/X.96 (*cont.*)

Call progress signal	Definition	Category	Applicable to					See Note
			Circuit switching	Packet switching		Frame relay		
				VC	PVC	SVC	PVC	
Remote procedure error	A procedure error caused by the remote DTE or an invalid facility request by the remote DTE is detected by the DCE at the remote DTE/DCE interface. Possible reasons are indicated in relevant X-series Recommendations on interfaces.	D1	–	M	M	M	M	
Long term network congestion	A major shortage of network resource exists.	D2	M	–	–	–	–	10
Quality of service not available	Requested Quality of service cannot be provided.	D2	–	–	–	M	–	14
Network operational	Network is ready to resume normal operation after a temporary failure or congestion.	C2	–	M	M	–	–	
Remote DTE operational	Remote DTE/DCE interface is ready to resume normal operation after a temporary failure or out of order condition (e.g. restart at the DTE/DCE interface). Loss of data may have occurred.	C1	–	–	M	–	M	
DTE originated	The remote DTE has initiated a clear, reset, restart or deflection procedure.	B ou D1	–	M	M	M	–	11
PAD clearing	The call has been cleared by the local PAD as an answer to an invitation from the remote DTE (X.28 only).	B	–	M (X.28 only)	–	–	–	
Private/public network reached	See Annex F/X.21.	A	–	–	–	–	–	13

Table 1/X.96 (*end*)

Call progress signal	Definition	Category	Applicable to					See Note
			Circuit switching	Packet switching		Frame relay		
				VC	PVC	SVC	PVC	
DTE interactive	The called DTE has registered for being inactive until the date and time indicated.	D1	–	–	–	–	–	
Call distribution within a hunt group	The call has been distributed within a hunt group at the called DTE.	A	–	O	–	–	–	

– Not applicable

M Mandatory in all networks

(M) Mandatory where the relevant optional user facility is provided

O Optional

FS Further study

NOTE 1 – The international implications of *controlled not ready* and *manual answering* are for further study.

NOTE 2 – Sent as confirmation/answer for the *redirection activation/deactivation* facility.

NOTE 3 – For circuit switching, applicable only to the calling DTE.

NOTE 4 – The *ROA out-of-order* call progress signal will not be returned to a DTE which does not subscribe to the *ROA selection* facility.

NOTE 5 – Some networks may use the *not obtainable* call progress signal to signal this condition.

NOTE 6 – Used as an alternative signal in networks where one or more of the conditions *uncontrolled not ready, DCE power off* and *network fault in the local loop* cannot be uniquely identified.

NOTE 7 – Although the basic *out-of-order* call progress signal is transmitted for these conditions, the diagnostic field in the *clearing* or *resetting* packet may give more precision.

NOTE 8 – The fact that a DTE is also out of order when the link access procedure layer is not operating correctly is a subject for further study.

NOTE 9 – Should be provided where the network can identify the condition.

NOTE 10 – Activated by the operational staff of the network.

NOTE 11 – Possible reasons for this include *reverse charging not accepted*. Reset, restart and deflection arc not applicable to the circuit-switching service.

NOTE 12 – Used only in conjunction with mobile maritime service.

NOTE 13 – Refer to Notes 3 and 4 of Annex F/X.21.

NOTE 14 – The Frame-relay network is unable to provide at least the lowest acceptable traffic parameters requested by the calling DTE.

NOTE 15 – Possible reasons for this are: specified transit network does not exist or does not serve the calling DTE.

NOTE 16 – Possible reasons for this are: called DTE rejects reverse charging facility requested by calling DTE or called DTE has subscribed to the facility *reverse charging prevention*.

NOTE 17 – The frame relay network can not presently provide data line connection identifiers at the calling or called interfaces.

NOTE 18 – Possible reasons for frame-relay networks are: calling DTE does not subscribe to closed user group facility.

NOTE 19 – Possible reasons for frame-relay networks are: called DTE rejects Reverse charging requested by calling DTE or called DTE activates Reverse charging prevention.

NOTE 20 – Unless out of order is provided.

Table 2/X.96

Category	Significance
A	Call not cleared. Calling DTE is expected to wait (for circuit-switched services only).
B	Call cleared because the procedure is complete.
C1 and C2	*Call cleared.* The call has failed due to conditions of a temporary nature. The DTE may try again after a suitable delay as the next attempt may be successful. However, after a number of unsuccessful call attempts with the same response, the action taken by the DTE should be as defined in category D1 or D2. Some Administrations may specify by regulation the interval between and maximum number of call attempts permitted by a DTE in these circumstances. *Reset* (for packet-switched and frame-relay services only). The DTE may continue to transmit data recognizing that data loss may have occurred.
D1 and D2	*Call cleared.* The calling DTE should take other action to clarify when the call attempt might be successful. *Reset* (for permanent virtual circuit only). The DTE should cease data transmission and take other action as appropriate.
C1 and D1	Due to subscriber condition.
C2 and D2	Due to network condition.

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