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Overall network aspects and functions – Performance
objectives

**Call processing performance for switched
virtual channel connections (VCCs) in a B-ISDN**

ITU-T Recommendation I.358

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ITU-T Recommendation I.358

Call processing performance for switched virtual channel connections (VCCs) in a B-ISDN

Summary

This Recommendation defines performance parameters and objectives for call processing in B-ISDNs for switched Virtual Channel Connections (VCCs). The B-ISDN call processing parameters defined in this Recommendation are applicable to point-to-point (Type 1) and point-to-multipoint (Type 2) connection topologies. The QoS relevant network performance objectives provided in this Recommendation are based on the general principles and generic performance parameters of ITU-T Rec. I.350. New performance-related aspects, associated with B-ISDN call processing functions providing access or disengagement, include the addition or release of a party to an existing B-ISDN connection. In a B-ISDN, a virtual connection can generally be either a Virtual Channel Connection (VCC) or a Virtual Path Connection (VPC). Since call processing capabilities are currently defined only for VCCs, a virtual connection within the context of this Recommendation is a VCC.

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Source

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FOREWORD

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ITU-T Recommendation I.358

Call processing performance for switched virtual channel connections (VCCs) in a B-ISDN

1 Scope

This Recommendation defines performance parameters and objectives for call processing in B-ISDNs. The B-ISDN call processing parameters defined in this Recommendation are applicable to point-to-point (Type 1) and point-to-multipoint (Type 2) connection topologies. Call processing delay parameters for point-to-point, single connection calls on 64 kbit/s channels are defined in ITU-T Rec. I.352. These parameters are used where relevant. Additional call processing performance parameters are defined for those call processing aspects that are new with B-ISDN. The parameters include QoS relevant network performance parameters (objectives) and the relationship to GOS parameters relevant to network design (no objectives) in order to provide a consistent approach between service requirements and network design. These parameters are specified in terms of reference events and measurement points defined in ITU-T Rec. I.353.

The QOS relevant network performance objectives provided in this Recommendation are based on the general principles and generic performance parameters of ITU-T Rec. I.350. According to these principles, performance parameters are established to characterize each call processing aspect that is new for B-ISDN with respect to the three generic performance criteria of speed, accuracy and dependability. The new performance-related aspects, associated with B-ISDN call processing functions providing access or disengagement, are the addition or release of a party to an existing B-ISDN connection. In a B-ISDN, a virtual connection can generally be either a Virtual Channel Connection (VCC) or a Virtual Path Connection (VPC). Since call processing capabilities are currently defined only for VCCs, a virtual connection within the context of this Recommendation is a VCC. Table 1 illustrates the application of the three generic performance criteria to each of the four new call processing functions that can be invoked for a B-ISDN call.

The parameters defined in this Recommendation are applicable only when the network is available. The availability of the network is the subject of another Recommendation.

Table 1/I.358 – Generic performance criteria for B-ISDN call processing functions

Call processing function	Speed	Accuracy	Dependability
1) Connection set-up	Connection set-up delay Connection post selection delay (Note 1) Connection answer signal delay (Note 1)	Connection set-up error probability	Connection set-up failure probability
2) Party set-up	Party set-up delay Party post selection delay (Note 1) Party answer signal delay (Note 1)	Party set-up error probability	Party set-up failure probability
3) Connection disengagement	Connection disconnect delay Connection release delay (Note 2)	Connection premature disconnect probability	Connection clearing failure probability
4) Party disengagement	Party disconnect delay Party release delay (Note 2)	Party premature disconnect probability	Party clearing failure probability
NOTE 1 – These parameters are defined for traffic engineering; objectives are not set for network performance.			
NOTE 2 – These parameters have local significance only; objectives will not be set.			

1.1 Bearer services

The set of bearer services covered by this Recommendation are those based upon switched virtual connections having:

- Type 1 or Type 2 topologies;
- ATM level traffic descriptors that can be communicated using the established signalling elements of ITU-T Rec. Q.2971; and
- ATM level QoS needs that can be communicated using the established signalling elements.

1.2 Purpose of this Recommendation

The purpose of this Recommendation is to define performance parameters and objectives for call processing in B-ISDNs.

The current issue of this Recommendation is limited to Type 1 (point-to-point) and Type 2 (point-to-multipoint) connection topologies with single party add/drop. Additional capabilities such as multiple connection calls and modification of connection characteristics are for further study.

Quality of Service information should be provided to the users after mapping network performance into user-oriented expressions.

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.

- [1] ITU-T Recommendation I.352 (1993), *Network performance objectives for connection processing delays in an ISDN*.
- [2] ITU-T Recommendation I.353 (1996), *Reference events for defining ISDN and B-ISDN performance parameters*.
- [3] ITU-T Recommendation I.350 (1993), *General aspects of quality of service and network performance in digital networks, including ISDNs*.
- [4] ITU-T Recommendation Q.2971 (1995), *Digital Subscriber Signalling System No. 2 – User-network interface layer 3 specification for point-to-multipoint call/connection control*.
- [5] ITU-T Recommendation Q.2762 (1999), *General functions of messages and signals of the B-ISDN User Part (B-ISUP) of Signalling System No. 7*.
- [6] ITU-T Recommendation Q.2931 (1995), *Digital Subscriber Signalling No. 2 – User-Network Interface (UNI) layer 3 specification for basic call/connection control*.
- [7] ITU-T Recommendation Q.2761 (1999), *Functional description of the B-ISDN user part (B-ISUP) of signalling system No. 7*.
- [8] ITU-T Recommendation Q.2650 (1999), *Interworking between signalling system No. 7 Broadband ISDN User Part (B-ISUP) and digital subscriber signalling system No. 2 (DSS2)*.
- [9] ITU-T Recommendation Q.2763 (1999), *Signalling System No. 7 B-ISDN User Part (B-ISUP) – Formats and codes*.

- [10] ITU-T Recommendation I.356 (2000), *B-ISDN ATM layer cell transfer performance*.
- [11] CCITT Recommendation E.721 (1999), *Network grade of service parameters and target values for circuit-switched services in the evolving ISDN*.
- [12] ITU-T Recommendation Q.766 (1993), *Performance objectives in the integrated service digital network application*.
- [13] ITU-T Recommendation Q.706 (1993), *Message transfer part signalling performance*.
- [14] ITU-T Recommendation Q.2110 (1994), *B-ISDN ATM adaptation layer – Service specific connection oriented protocol (SSCOP)*.

3 Abbreviations

This Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
ACM	Address Complete Message
ANM	Answer Message
AP	Add Party
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
B-ISUP	Broadband ISDN Signalling User Part
CASD	Connection Answer Signal Delay
CCFP	Connection Clearing Failure Probability
CDD	Connection Disconnect Delay
CP-AAL	Common Part AAL
CPE	Customer Premises Equipment
CPSD	Connection Post Selection Delay
CRD	Connection Release Delay
CSD	Connection Set-up Delay
CSFP	Connection Set-up Failure Probability
FFS	For Further Study
GOS	Grade of Service
HRX	Hypothetical Reference Connection
IAM	Initial Address Message
IIP	International Interoperator Portion
INI	Inter-Network Interface
ISC	International Switching Centre
ISDN	Integrated Service Digital Network
ITP	International Transit Portion

ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
MPI	Measurement Point International
MPT	Measurement Point Terminal
MSU	Message Signal Unit
NNI	Network-Node Interface
PASD	Party Answer Signal Delay
PCFP	Party Clearing Failure Probability
PDD	Party Disconnect Delay
PH	PHysical layer
PPSD	Party Post Selection Delay
PRD	Party Release Delay
PSD	Party Set-up Delay
PSFP	Party Set-up Failure Probability
QoS	Quality of Service
RE	Reference Event
REL	Release
SSCF	Service Specific Coordination Function
SSCOP	Service Specific Connection Oriented Protocol
STP	Signalling Transfer Point
TE	Terminal Equipment
UNI	User-Network Interface
VBR	Variable Bit Rate
VC	Virtual Channel
VCC	Virtual Channel Connection
VCI	Virtual Channel Identifier
VP	Virtual Path
VPC	Virtual Path Connection

4 Reference model

Within the context of this Recommendation, a reference model is intended to establish the context for the definition of performance parameters and the specification of objectives. This reference model provides a baseline reference connection that includes measurement points at which performance-significant reference events are observed and values for B-ISDN call processing performance parameters are determined, and a specification of the traffic loading conditions under which objectives are to be met. This reference model consists of a reference configuration, a set of performance-significant reference events, and time intervals for establishing the conditions under which objectives are to be met.

4.1 Reference configuration

Figure 1 illustrates a reference configuration that is applicable for characterizing call processing performance for point-to-point (Type 1) and point-to-multipoint (Type 2) B-ISDN virtual connection topologies. Figure 1 is equivalent to the reference configuration of ITU-T Rec. I.352 (which is applicable to point-to-point calls in an ISDN based on 64 kbit/s channels) when $N = 2$, and the capacity of the virtual connection is equivalent to 64 kbit/s.

All B-ISDN call processing performance parameters are specified at measurement points. These measurement points are defined consistent with ITU-T Rec. I.353, where a Measurement Point T (MPT) is located at a User-Network Interface (UNI) and a Measurement Point I (MPI) is located at an interface that terminates an ATM transmission system at an international Switching Center (ISC). The measurement points in Figure 1 are identified according to the method established below. In cases where one MPI supports a connection to several topological parties, that MPI is identified by several sets of systematic indices as described below:

- MPT(j) represents the MPT associated with party j.
 - MPI(j,k) represents the MPI delimiting the national portion containing party j and carrying the connection from party j to party k.
 - MPI(k,j) represents MPI delimiting the national portion containing party k and carrying the connection from party j to party k.
- $k, j \in \{1, \dots, N\}$ representing the N parties.

This notation can be used for multipoint-to-multipoint topologies when they are supported. A third index could be added when multi-connection calls are supported.

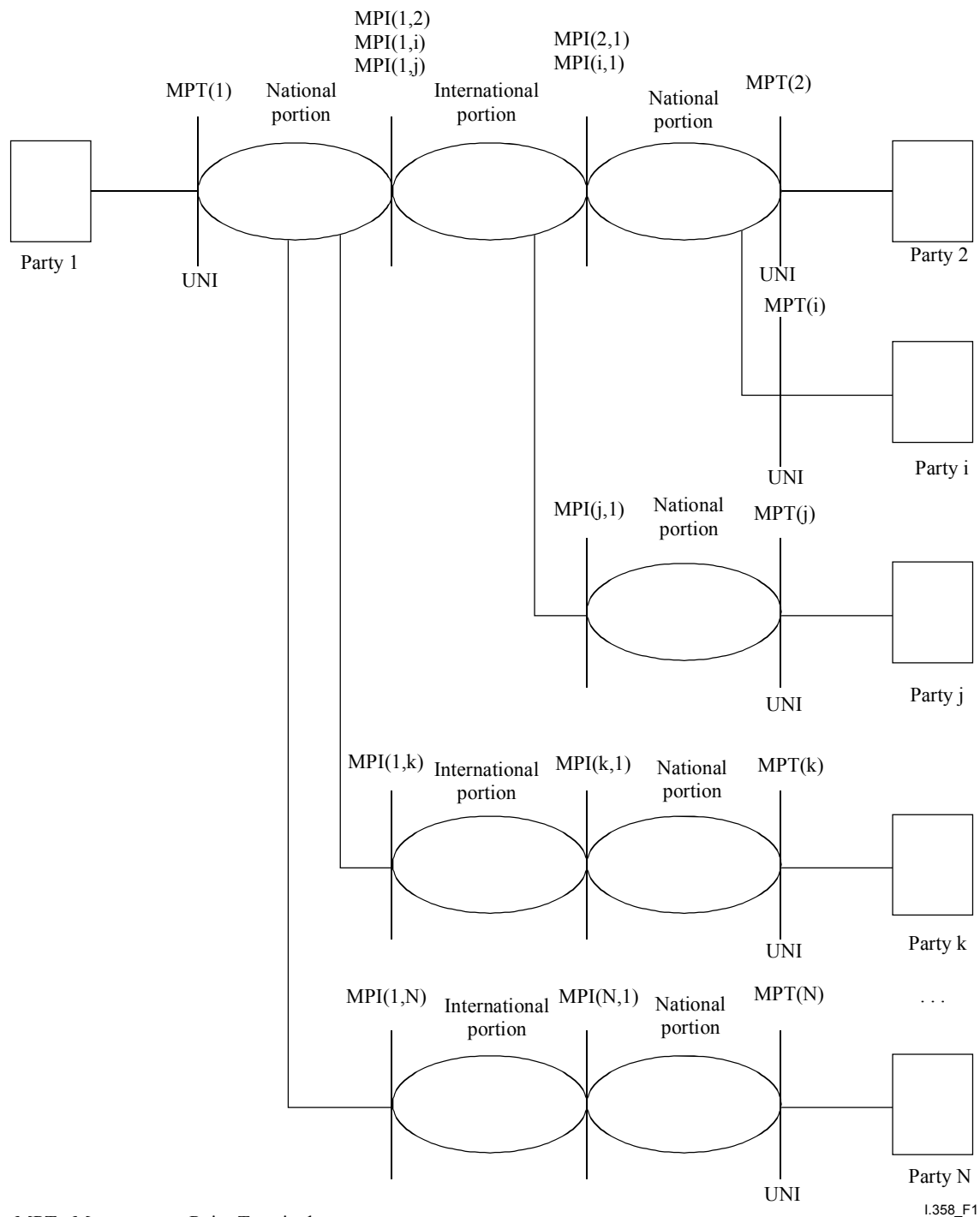


Figure 1/I.358 – Reference configuration for B-ISDN call processing performance

4.2 Reference events

The reference events used for defining B-ISDN call processing performance parameters are found in ITU-T Rec. I.353. Reference events will be defined at MPI type measurement points based on Q.2762 messages, and at MPT type measurement point based on Q.2931 and Q.2971 messages.

For each B-ISDN call processing function identified in Table 1, Table 2 will list the performance-significant reference events associated with the Q.2931 or Q.2972 protocol.

For each B-ISDN call processing function identified in Table 1, Table 3 will list the performance-significant reference events associated with the Q.2761 protocol and its signalling messages. Interworking between the Q.2931 and Q.2971 protocols and their messages is described in ITU-T Rec. Q.2650.

**Table 2/I.358 – Performance-significant reference events
based on Q.2931 and Q.2971 layer 3 message transfer**

Call processing function	Signalling message	Purpose	Code
1) Connection set-up			
Set-up at MPT(1)	SETUP	Request call establishment	T1a
Set-up at MPT(2)	SETUP	Call arrival notification	T1b
Set-up at MPT(2)	CONNECT	Accept arrived call	T2a
Set-up at MPT(1)	CONNECT	Acknowledge call establishment	T2b
Alerting at MPT(2)	ALERTING	Acknowledge called party alerted	T9a
Alerting at MPT(1)	ALERTING	Called party alerted	T9b
2) Party set-up			
Add at MPT(1)	ADD PARTY	Request party establishment	T5a
Add at MPT(i) i=3,N	ADD PARTY	Call arrival notification	T5b
Add at MPT(i) i=3,N	ADD PARTY ACK	Accept party acknowledgment	T6a
Add at MPT(1)	ADD PARTY ACK	Acknowledge party establishment	T6b
Party Alerting at MPT(i) i=3,N	PARTY ALERTING	Acknowledge add party alerted	T10a
Party Alerting at MPT(1)	PARTY ALERTING	Add party alerted	T10b
3) Connection disengagement			
Disconnect at MPT(1)	RELEASE	Request connection release	T3a
Disconnect at MPT(i) i=2,N	RELEASE	Party release notification	T3b
Connection Release at MPT(1)	RELease COMplete	Confirm release (local)	T4b
4) Party disengagement			
Drop Party at MPT(1)	DROP PARTY	Request party drop	T7a
Drop Party at MPT(i) i=2,N	DROP PARTY	Party drop notification	T7b
Disconnect Party by MPT(i) i=2,N	RELEASE	Request party disconnect	T3a
Disconnect Party at MPT(1)	RELEASE	Receive party disconnect	T3b
Drop Party at MPT(1)	DROP PARTY ACK	Confirm drop (local)	T8b
Drop Party at MPT(i) i=2,N	RELease COMplete	Confirm party release (local)	T4b