



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Series Q

Supplement 10

(12/1999)

SERIES Q: SWITCHING AND SIGNALLING

Technical Report TRQ.2002: Information Flow Elements

ITU-T Q-series Recommendations – Supplement 10

(Formerly CCITT Recommendations)



Documents

Document Sharing Hub

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120– Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250– Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.339
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600– Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
BROADBAND ISDN	Q.2000–Q.2999

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

TECHNICAL REPORT TRQ.2002: INFORMATION FLOW ELEMENTS

Summary

This Supplement specifies the information flow elements that will be used in the development of the TRQ.2xxx series of signalling requirements. The content of the information flow elements are based on the general aspects as defined in the Supplement 7 – Technical Report TRQ.2001: General aspects for the development of unified signalling requirements.

Source

Supplement 10 to ITU-T Q-series Recommendations was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 5 procedure on 3 December 1999.

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

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this publication may involve the use of a claimed Intellectual Property Right. The 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 publication development process.

As of the date of approval of this publication, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this publication. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

© ITU 2001

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 the ITU.

CONTENTS

	Page
1 Scope	1
2 Normative References	1
3 Definitions	1
4 Abbreviations	2
5 Information flow principles	2
5.1 Information flows and FE actions for release one service.....	2
5.2 Information flow conventions for capability set three services.....	2
5.2.1 Convention of reference direction.....	2
5.2.2 Convention for ATM switch through.....	3
5.2.3 Information flow terminology.....	3
6 Description of information flow elements.....	7
6.1.1 Call-&-Bearer-Set-up Information Flow Sequence	8
6.1.2 Call-Set-up Information Flow Sequence.....	8
6.1.3 Join-Call-&-Bearer Information Flow Sequence	8
6.1.4 Join-Call Information Flow Sequence.....	8
6.1.5 Add-Bearer-to-Call Information Flow Sequence.....	8
6.1.6 Add-Party-to-Bearer Information Flow Sequence	8
6.1.7 Attach-Party-to-Bearer Information Flow Sequence	8
6.1.8 Add-Party-to-Call Information Flow Sequence	8
6.1.9 Add-Party-&-Bearer-to-Call Information Flow Sequence.....	8
6.1.10 Detach-Party-from-Bearer Information Flow Sequence	8
6.1.11 Release-Bearer Information Flow Sequence.....	9
6.1.12 Release-Party-from-Call Information Flow Sequence	9
6.1.13 Request-Detach-Party-from Bearer Information Flow Sequence	9
6.1.14 Request-Release-Party-from-Call Information Flow Sequence.....	9
6.1.15 Release-Call Information Flow Sequence.....	9
6.1.16 Release-Call-&-Bearer Information Flow Sequence	9
6.1.17 Renegotiate-Bearer Information Flow Sequence	9
6.1.18 Modify-Bearer Information Flow Sequence	9
6.1.19 Remote-Call-&-Bearer-Set-up Information Flow Sequence.....	9
6.1.20 Remote-Add-Bearer-to-Call Information Flow Sequence	9
6.1.21 Remote-Add-Party-to-Bearer Information Flow Sequence	9
6.1.22 Remote-Attach-Party-to-Bearer Information Flow Sequence.....	10
6.1.23 Remote-Add-Party-&-Bearer-to-Call Information Flow Sequence.....	10
6.1.24 Remote-Detach-Party-from-Bearer Information Flow Sequence	10
6.1.25 Remote-Release-Party-from-Call Information Flow Sequence	10
6.1.26 Remote-Release-Bearer Information Flow Sequence	10



Documents

Document Sharing Hub

6.1.27	Interrogation-Terminating-End-Point Information Flow Sequence.....	10
6.1.28	Look-Ahead Information Flow Sequence	10
6.1.29	Report-End/Edge Information Flow Sequence	10
6.1.30	Report-Link Information Flow Sequence	10
6.1.31	Notify-Call-Change Information Flow Sequence	11
6.1.32	Notify-Call-&-Bearer-Change Information Flow Sequence.....	11
6.1.33	Notify-Bearer-Change Information Flow Sequence	11
6.2	Relationship between Parameters of Information Flows and Stage 2 model.....	11
6.3	Information Flow and Stage 2 Model.....	14
6.4	Information Parameters for Information Flows.....	15
6.4.1	Call-&-Bearer-Set-up – Call-Setup & Join-Call-&-Bearer.....	15
6.4.2	Join-Call – Add-Bearer-to-Call & Add-Party-to-Bearer.....	17
6.4.3	Attach-Party-to-Bearer – Add-Party-to-Call & Add-Party-&-Bearer-to- Call	19
6.4.4	Detach-Party-from-Bearer – Release-Bearer – Release-Party-from Call & Request-Detach-Party-from-Bearer.....	21
6.4.5	Request-Release-Party-from-Call – Release-Call – Release-Call-&-Bearer & Look Ahead	23
6.4.6	Renegotiate-Bearer – Modify-Bearer – Remote-Call-&-Bearer-Setup.....	25
6.4.7	Remote-Add-Bearer-to-Call – Remote-Add-Party-to-Bearer – Remote-Attach-Party-to-Bearer	27
6.4.8	Remote-Add-Party-&-Bearer-to-Call, Remote-Detach-Party-from Bearer, Remote-Release-Party-from-Call, & Interrogation-Terminating-End-Point	29
6.4.9	Remote-Release-Bearer, Report-enD/Edge, Report-Link, Notify-Call- Change, Notify-Call-&-Bearer-Change, & Notify-Bearer-Change	31

Supplement 10 to Q-series Recommendations

TECHNICAL REPORT TRQ.2002: INFORMATION FLOW ELEMENTS

1 Scope

The purpose of this Supplement is to provide a single reference document containing the set of information flows that are used in the signalling requirement documents contained in the Technical Report series of supplements (TRQ.21xx and TRQ.22xx and TRQ.23xx).

2 Normative References

The following Technical Reports and other references contain provisions which, through reference in this text, constitute provisions of this Supplement. At the time of publication, the editions indicated were valid. All supplements and other references are subject to revision; all users of this Supplement are therefore encouraged to investigate the possibility of applying the most recent edition of the supplements and other references listed below. A list of the currently valid ITU-T Recommendations and supplements is regularly published.

- [1] ITU-T Q-series Recommendations – Supplement 9 (1999), *Technical Report TRQ.2000: Roadmap for the TRQ.2xxx-series Technical Reports.*
- [2] ITU-T Q-series Recommendations – Supplement 7 (1999), *Technical Report TRQ.2001: General aspects for the development of unified signalling requirements.*

3 Definitions

This Supplement defines the following terms:

- 3.1 **addressed party:** The party addressed by the requested signalling capability.
- 3.2 **addressed serving node:** Network equipment associated with the party addressed by the requested signalling capability.
- 3.3 **backward:** The direction from the addressed party to the party requesting a signalling capability.
- 3.4 **network connection:** An ATM network connection of topology type 1 to 5 as defined in Table 1-4/TRQ.2001 [1].
- 3.5 **call:** An end-to-end communications service between two or more call party end points, or between one call party end point and its Serving Node.
- 3.6 **call owner:** One who initiates a call is the Call Owner. There is only one Call Owner per call.
- 3.7 **forward:** The direction from the requesting party to the addressed party.
- 3.8 **party owner:** One who adds a party to a call is the owner of that party. There may be several party Owners within a call.
- 3.9 **relay node:** Network equipment, such as a transit bearer exchange, which contains a bearer control functional entity but no call control functional entity.
- 3.10 **requesting party:** The party requesting a signalling capability.
- 3.11 **requesting serving node:** Network equipment associated with the party requesting a signalling capability.

3.12 serving node: Network equipment, such as a local exchange or private branch exchange, which contains call control and bearer control functional entities.

4 Abbreviations

This Supplement uses the following abbreviations:

NA Not Applicable

PEP Party End Point

5 Information flow principles

5.1 Information flows and FE actions for release one service

The information flows and functional entity actions are covered in Recommendation Q.71.

5.2 Information flow conventions for capability set three services

The drawing conventions associated with user plane and control plane reference direction, ATM switch through, symbology used to describe functional entity actions during connection establishment are contained in the following figures.

5.2.1 Convention of reference direction

See Figure 5-1.

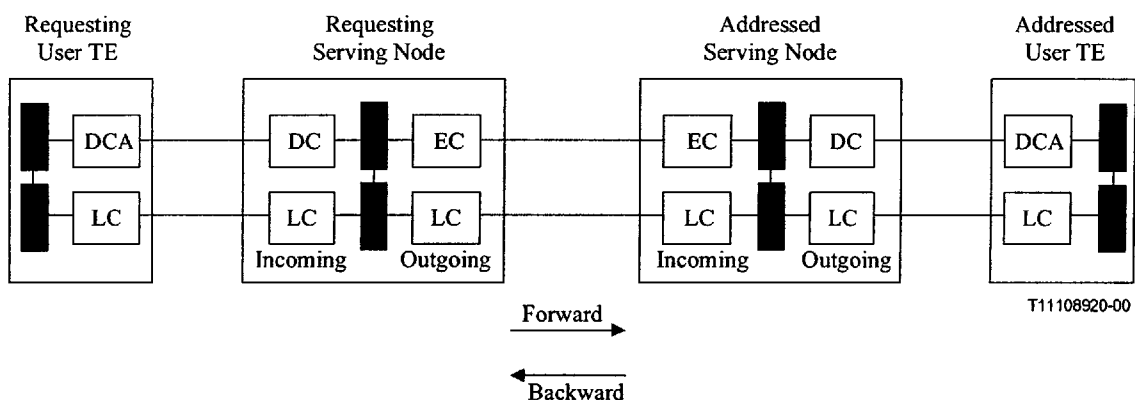


Figure 5-1 – Reference Direction Convention

- Requesting Serving Node is associated with the user terminal requesting a signalling capability.
- Addressed Serving Node is associated with the user terminal addressed by the requested signalling capability.
- Incoming side of a Node is the side closest to the user terminal requesting a signalling capability.
- Outgoing side of a node is the side closest to the user terminal addressed by the requested signalling capability.
- Forward direction is from the requesting user terminal to the addressed user terminal.
- Backward direction is from the addressed user terminal to the user terminal requesting a signalling capability.

The reference to the incoming side and outgoing side is independent of the direction of transport of user data. When a call establishment signalling action has been requested, then the requesting user TE becomes the originating user TE and the requesting serving node becomes the originating serving node. In the same instance, the addressed user TE becomes the terminating user and the addressed serving node becomes the terminating serving node. However, when other signalling capabilities are invoked, the above convention is more useful since these actions could be invoked by a party that did not originate the call.

5.2.2 Convention for ATM switch through

Figure 5-2 illustrates the switch convention to be used in the handling of ATM connections within a network node.

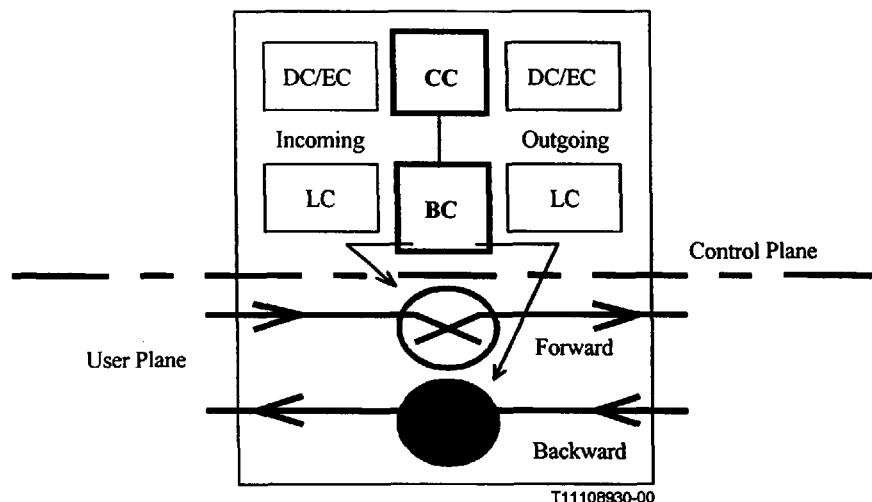


Figure 5-2 – Convention for ATM switch through

- The "BC" is responsible for bandwidth reservation, bandwidth allocation, connection switch through, connection release, and bandwidth release in the forward and backward direction.

5.2.3 Information flow terminology

The terminology for information flows to be used in the stage 2 representation of the signalling capability sets are covered in this subclause. The signalling information flows are based on the two "generic" information flow sequences illustrated below.

It is useful to conceive for the exchange of information between peer functional entities in terms of both one-phase and two-phase interactions. The one-phase mechanism is analogous to the two message request/response approach, while the two-phase is analogous to the CCR begin/ready/commit. Both of these mechanisms can be combined into a single one using CCR terminology as shown below.

All peer-to-peer exchanges are defined in terms of a superior/subordinate relationship according to the following definitions:

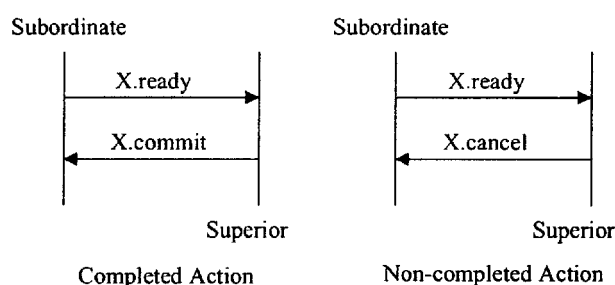
5.2.3.1 superior: The entity that ultimately decides on the commitment.

5.2.3.2 subordinate: The peer of the superior.

The type A request (one phase mechanism) consists of the following exchange.

The requesting functional entity, acting as a subordinate, signals its peer with X.ready – where X represents the action to be performed. If the requested operation is successful, the superior functional entity shall complete the requested action and notify the subordinate functional entity that the action

has been completed with X.commit. If the action cannot be completed, the superior functional entity will notify the subordinate functional entity that the action was not completed with X.cancel. This is shown in the information flow in Figure 5-3 below:

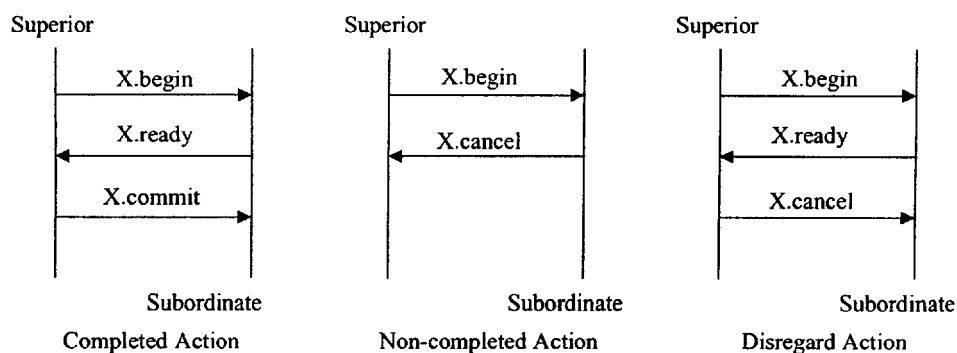


T11108940-00

Figure 5-3 – Information flows for single-phase request mechanism

The type B request (two-phase mechanism) consists of the following exchange.

The requesting functional entity, acting as a superior, signals its peer with X.begin. If the request will be able to be completed, the subordinate functional entity shall notify the superior functional entity of this condition with X.ready and wait for further instructions from the superior functional entity before the requested action is completed. The superior may respond with either a flow that indicates that the action shall be completed (X.commit) or with a flow that indicates that the receiver shall disregard the requested action (X.cancel). If the requested operation is not successful, the subordinate functional entity shall notify the superior functional entity with X.cancel. These flows are illustrated below in Figure 5-4.



T11108950-00

Figure 5-4 – Information flows for two-phase request mechanism

Figures 5-5 and 5-6 illustrate where the one-phase and two-phase mechanism are used.

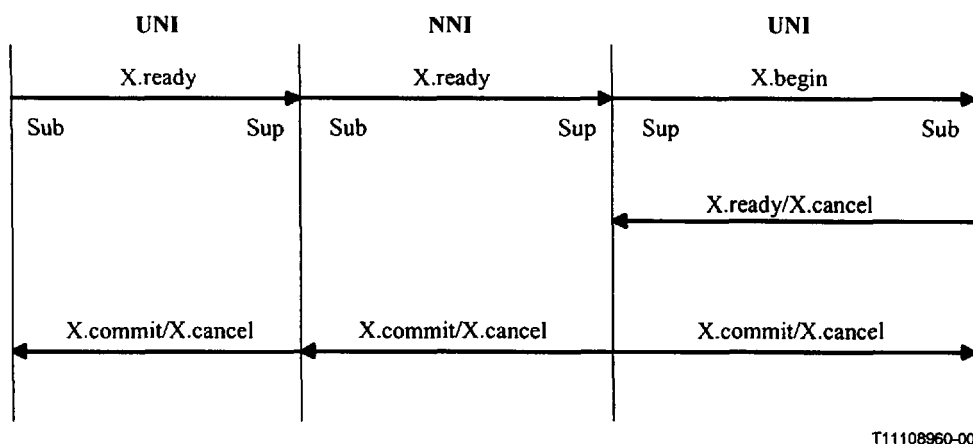


Figure 5-5 – UNI/NNI flows with one-phase request on NNI

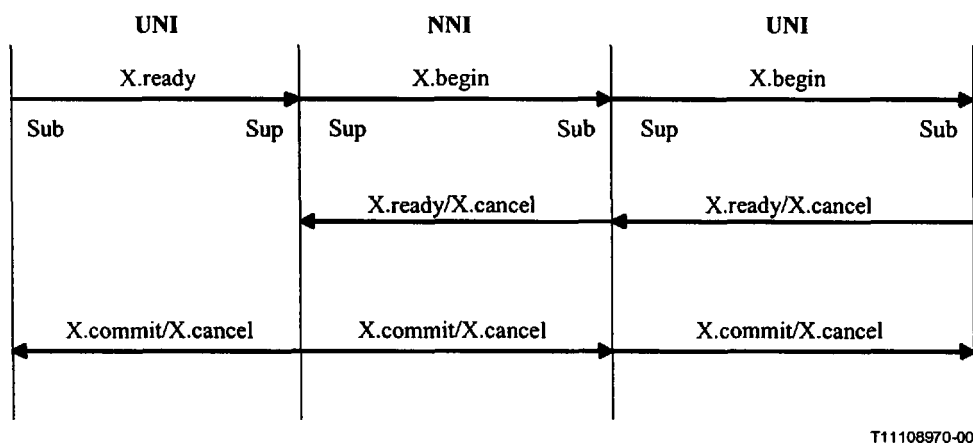
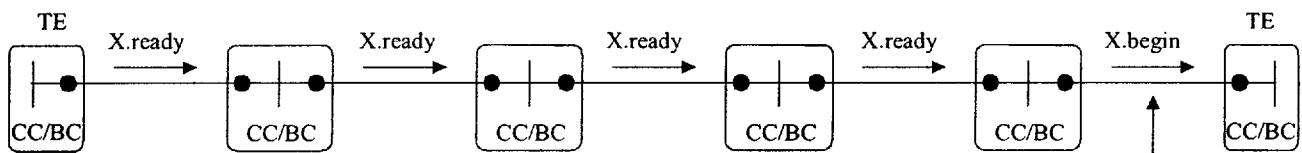
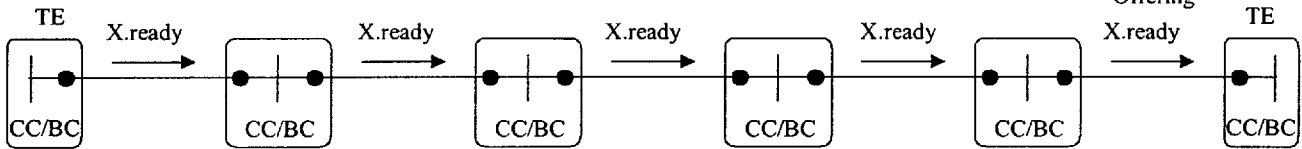


Figure 5-6 – UNI/NNI flows with two-phase request on NNI

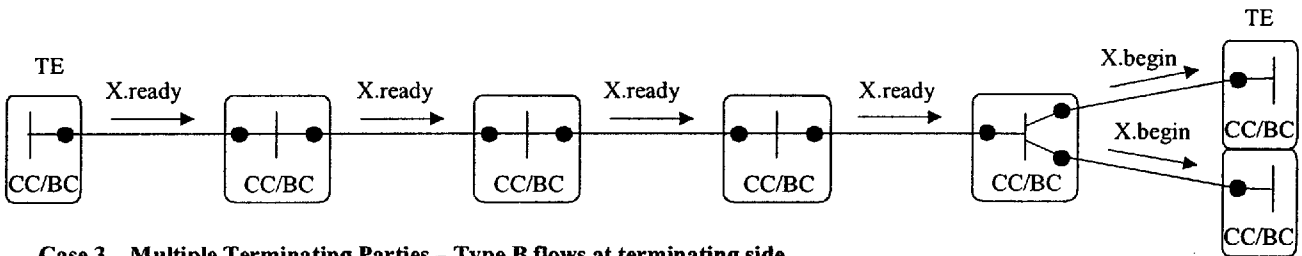
In Figure 5-5, the one-phase mechanism is used at the calling (or requesting) users side, and both the one-phase and the two-phase mechanisms are used at the called (or confirming) users side. Either mechanism can be employed at the NNI, depending on which side should have the ultimate authority to commit. The authority is generally transferred to the called user side when there is a single mandatory party.



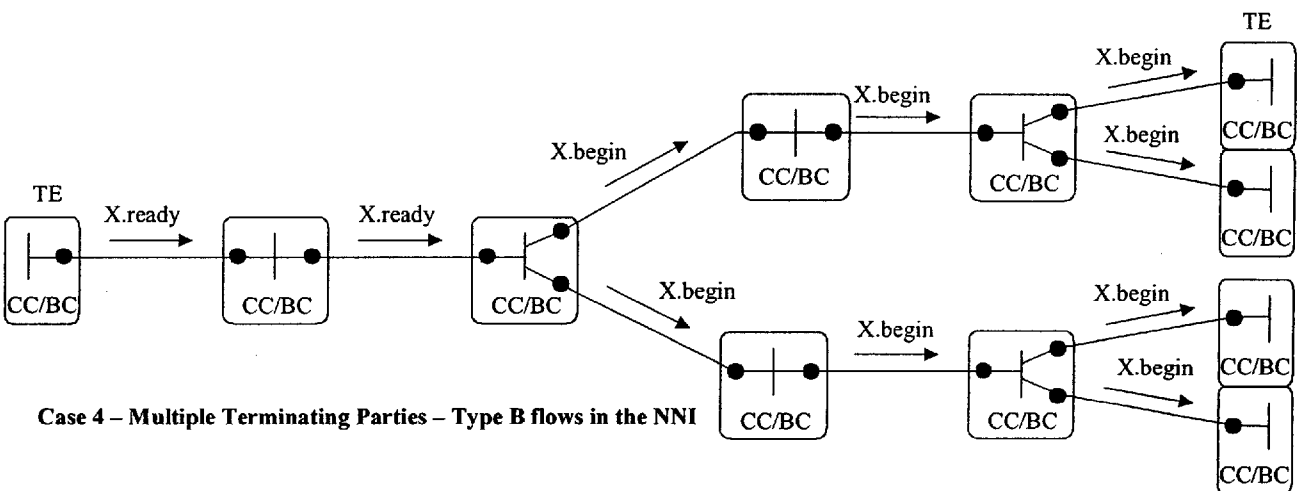
Case 1 – Single Terminating Party – Type B flows at terminating side



Case 2 – Single Terminating Party – Type A flows at terminating side



Case 3 – Multiple Terminating Parties – Type B flows at terminating side



Case 4 – Multiple Terminating Parties – Type B flows in the NNI

T11108980-00

Figure 5-7 – Flows illustrating conversion of X.ready to X.begin

An unconfirmed information flow has also to be considered e.g. in order to support the notification capability items. The set of mechanisms may be executed e.g. in order to cover user-to-user negotiation of U-plane attributes.

It should be noted that for human non-interactive based services, the generic information flow sequence is terminated by either a single X.cancel, or one X.commit information flow.