

ARIB STD-T78



MITF Dial Up Dormant Protocol

ARIB STANDARD

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Association of Radio Industries and Businesses

General notes for the ARIB standard in English version:

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The original "MITF Dial-up Dormant Protocol Specification" is written in Japanese and has been approved by the 38th Standard Assembly Meeting July 27, 2001. This document is the translation of the standard into English.

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1. Summary of Protocol

This controlling system, using transmission-control function of PIAFS, ISDN, etc., provides procedure-controlling connection by activation/inactivation of data utilizing the Internet.

1.1 Positioning of MITF dial-up dormant protocol

The positioning of MITF dial-up dormant protocol is shown in the following figure.

To high level protocol, the MITF dial-up dormant protocol provides temporary disconnection function and re-connection function.

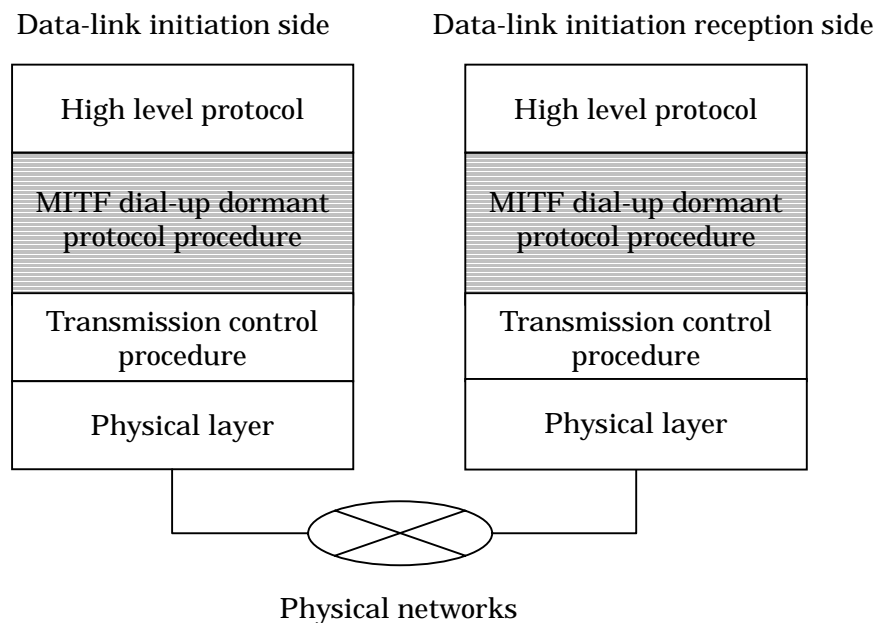


Fig. 1.1. Communication environment applying MITF dial-up dormant function

High level protocol in the above situation refers to the protocol that depends on an application program such as Fax, PC, and Internet communications. Physical Layer refers to the level that converts the transmission format which is output in these specifications to a compatible classification with the physical networks.

1.2 Outline of MITF dial-up dormant procedure

The outline of MITF dial-up dormant procedure is composed of

- i) Data-link initiation side procedure (conducting dormant request)
- ii) Data link arrival side procedure (sending response to dormant request).

1.3. Services provided

MITF dial-up dormant function provides following services to high level protocol:

- Concealment of data-link disconnection (transition to dormant state)
- Data-link reconnection (recovering from dormant state; provided only from data-link initiation side)

2. Negotiation procedure

2.1. PPP frame structure

MITF dial-up dormant message is encapsulated with Point to Point Protocol (PPP) frame.

The PPP frame is as follows:

Flag	Address	Control	MITF dial-up dormant identifier	MITF dial-up dormant message	FCS	Flag
8bit	8bit	8bit	16bit	(Variable length)	16bit	8bit

2.2. Field format

2.2.1. Flag field

Used for identifying PPP frame

<u>Bit</u>	8	7	6	5	4	3	2	1	
	0	1	1	1	1	1	1	0	MITF dial-up dormant message flag

2.2.2. Address field

Address field is used at following fixed values:

<u>Bit</u>	8	7	6	5	4	3	2	1	
	1	1	1	1	1	1	1	1	MITF dial-up dormant message address

2.2.3. Control field

Control field is used at following fixed values:

<u>Bit</u>	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	1	1	MITF dial-up dormant message control field

2.2.4. MITF dial-up dormant identifier field

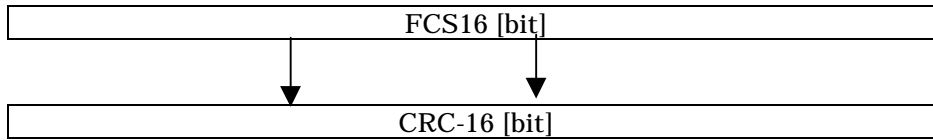
MITF dial-up dormant identifier field is used at following fixed values:

<u>Bit</u>	8	7	6	5	4	3	2	1	
	0	0	1	0	0	0	1	1	MITF dial-up dormant identifier field
	0	0	1	0	0	0	1	1	Identifier field

2.2.5. Frame Check Sequence (FCS)

The field to detect frame errors. The content is CRC-16.

The generator polynomial expression follows $X^{16} + X^{15} + 1$ (ITU-T recommendation V.42 (LAPM option))



3. MITF dial-up dormant procedure

3.1. MITF dial-up dormant message structure

Message classification	Result code	CID	Added information
8bit	8bit	32bit	(Variable length)

3.2. Field format

3.2.1. MITF dial-up dormant message classification

The MITF dial-up dormant message classification is as follows:

Bit	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	0	1	Connection request
	0	0	0	0	0	0	1	0	Connection response
	0	0	0	0	0	0	1	1	Disconnection request
	0	0	0	0	0	1	0	0	Disconnection response
	0	0	0	0	0	1	0	1	Reconnection request
	0	0	0	0	0	1	1	0	Reconnection response
	1	0	0	0	0	0	0	0	Reset request

(1) Connection response

The following are set as added information of connection response:

- Authentication key (mandatory)
- Traffic idle check timer (optional)
- Redial phone number (optional)

(2) Disconnection request

The following is set as added information of disconnection request:

- Authentication key (optional)

(3) Reconnection request

The following are set as added information of reconnection request:

- Authentication key (mandatory)
- Traffic idle check timer (optional)

(4) Reconnection response

The following is set as added information of reconnection response:

- Traffic idle check timer (optional)

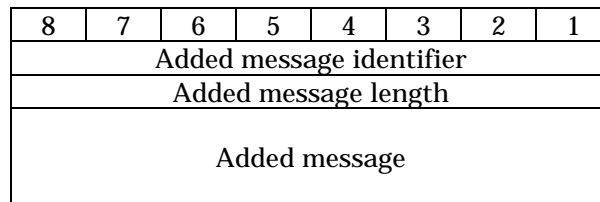
3.2.2. Result code

The result code is as follows:

Bit	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	0	0	Normal
	0	0	0	0	0	0	0	1	Invalid CID
	0	0	0	0	0	0	1	0	State error
	0	0	0	0	0	0	1	1	Message classification error
	0	0	0	0	0	1	0	0	Resource unavailable
	1	1	1	1	1	1	1	1	Other

3.3. Added information frame

Added message identifier 8bit	Added message length 8bit	Added message (Variable length)
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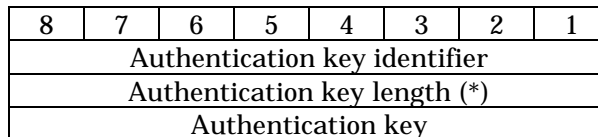
3.4. Field format

3.4.1. Added information field

3.4.1.1. Authentication key

Used for authentication. (Definable at data-link initiation reception side.)

Bit	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	0	1	Authentication key (added message identifier)



* "Authentication key length" refers to the length of "authentication key" (octet length.)

3.4.1.2. Redial phone number

Bit	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	1	0	Redial phone number (Added message identifier)

8	7	6	5	4	3	2	1
Redial phone number identifier							
Redial phone number length							
A	Type of number						
B	Numbering plan identifier				Reserved		
2nd number				1st number			
Nth number (or filler)				Mth number			

- Type of number
- 0000000 : Reserved
- 0000001 : International number
- 0000010 : National number
- 0000011 : Network specific number
- 0000111 : Reserved for future expansion
- Other : Reserved

- A : Odd/even number indicator
 - 0 : Number with even number digit
 - 1 : Number with odd number digit
- } *Reserved

- B: Reserved

- Numbering plan identifier
- 000 : Reserved
- 001 : ISDN numbering plan
- Other : Reserved

- 1st number – Nth number

- 0=a
- 1=1
- 2=2
- 3=3
- 4=4
- 5=5
- 6=6
- 7=7
- 8=8
- 9=9
- *=b
- #=c

If redial number is odd digit, the Nth number becomes filler, and all the data in filler area become "0."

3.4.1.3. Traffic idle check timer

Bit	8	7	6	5	4	3	2	1
	0	0	0	0	0	0	1	1

Traffic idle check timer
(Added message identifier)

8	7	6	5	4	3	2	1
Traffic idle check timer identifier							
Traffic idle check timer length (fixed at 2)							
Traffic idle check timer (0-65535)							

3.5. Bit sending order

The sending sequence to frame line is to be flag, address, and control field. All information is sent in sequence from the highest bit to lower bit. Each octet is also sent from the highest bit.

4. Action sequence

4.1. Starting MITF dial-up dormant function

4.1.1. Data-link initiation side

When data are transmitted from high level protocol (PPP) to the data-link initiation reception side, the data-link initiation side transmits "connection request" (MITF dial-up dormant function message) to the data-link initiation reception side after establishing link.

At reception of "connection response" from the data-link initiation reception side, the data-link initiation side extracts CID used at reconnection from "connection response" signal of the data-link initiation reception side and saves it.

After that, Traffic idle check timer is set, and the state is changed to "active state." In case of timeout of control message and of abnormal termination of control message negotiation due to parameter incompatibility, etc., link is released.

4.1.2. Data-link initiation reception side

After receiving "connection request" (MITF dial-up dormant message) from the data-link initiation side, the data-link initiation reception side captures CID, sets captured CID and authentication key in "connection response" and transmits to the data-link initiation side, and changes state to "active state."

4.2. Terminating MITF dial-up dormant function (permanent disconnection)

4.2.1. Data-link initiation side

When Terminate-Request is made from high level protocol, the data-link initiation side cancels "Traffic idle check timer" and transmits "disconnection request" (MITF dial-up dormant message) to the data-link initiation reception side.

When receiving "disconnection response" from the data-link initiation reception side, the data-link initiation side releases link, and changes state to "free state."

In case of timeout of control message and abnormal termination of control message negotiation due to parameter incompatibility.

4.2.2. Data-link initiation reception side

When receiving "disconnection request" (MITF dial-up dormant message) from the data-link initiation side, the data-link initiation reception side sends "disconnection response" (MITF dial-up dormant message) to the data link initiation side, and changes state to "free state."

4.3. Temporary disconnecting MITF dial-up dormant function

4.3.1. Data-link initiation side

In case the state of data-link initiation side is "active state," when idle communication continues longer than the value of "Traffic idle check timer," the timeout of the timer occurs.

In such a case, the data-link initiation side releases link in order to temporarily release link of lower level, and changes state to "dormant state."

4.3.2. Data-link initiation reception side

In case the state of data-link initiation reception side is "active state," when link release notification is received, the data-link initiation reception side changes state to "dormant state" after starting "data-link-preserving timer."

4.4. Reconnecting MITF dial-up dormant function

4.4.1. Data-link initiation side

In case the state of the data-link initiation side is “dormant state,” when data is sent from high level protocol (PPP) to the data-link initiation reception side, the data-link initiation side transmits “reconnection request” (MITF dial-up dormant message) to the data-link initiation reception side after establishing link. After that, when receiving “reconnection response” (MITF dial-up dormant message) from the data-link initiation reception side, the data-link initiation side starts “Traffic idle check timer” and changes state to “active state.” In case of timeout of control message and of abnormal termination of control message negotiation due to parameter incompatibility, etc., the data-link initiation side releases link.

4.4.2. Data-link initiation reception side

When the state of the data-link initiation reception side is “dormant state,” if receiving link establishment notification and receiving “reconnection request” (MITF dial-up dormant message) from the data-link initiation side, the data-link initiation reception side cancels “data-link preservation timer.” In addition, the data-link initiation reception side sends “reconnection response” (MITF dial-up dormant message) to the data-link initiation side, and changes state to “active state.” In case authentication fails, the data-link initiation reception side releases link.

4.5. Sequence illustration examples

- Fig. 4.5.1. New connection sequence
- Fig. 4.5.2. Temporary disconnection sequence
- Fig. 4.5.3. Unexpected disconnection sequence
- Fig. 4.5.4. Reconnection sequence
- Fig. 4.5.5. Permanent disconnection sequence from the data-link initiation side
- Fig. 4.5.6. New connection- connection request wait T.O. sequence
- Fig. 4.5.7. New connection- connection response wait T.O. sequence
- Fig. 4.5.8. New connection-detecting internal resource shortage sequence
- Fig. 4.5.9. New connection-connection response wait disconnection sequence
- Fig. 4.5.10. Temporary disconnection-data-link preservation timer T.O. sequence
- Fig. 4.5.11. Temporary disconnection-data-link disconnection. sequence
- Fig. 4.5.12. Reconnection-reconnection request wait T.O. sequence
- Fig. 4.5.13. Reconnection-reconnection response wait T.O. sequence
- Fig. 4.5.14. Reconnection-detecting internal resource shortage sequence
- Fig. 4.5.15. Reconnection-reconnection response wait data-link disconnection sequence
- Fig. 4.5.16. Reconnection-data-link initiation side CID abnormality sequence
- Fig. 4.5.17. Reconnection-data-link initiation reception side CID abnormality sequence
- Fig. 4.5.18. Reconnection-reconnection request wait disconnection sequence
- Fig. 4.5.19. State incompatibility (data-link initiation side: temporary disconnection; data-link initiation reception side: idle) sequence
- Fig. 4.5.20. Reconnection from dormant release sequence

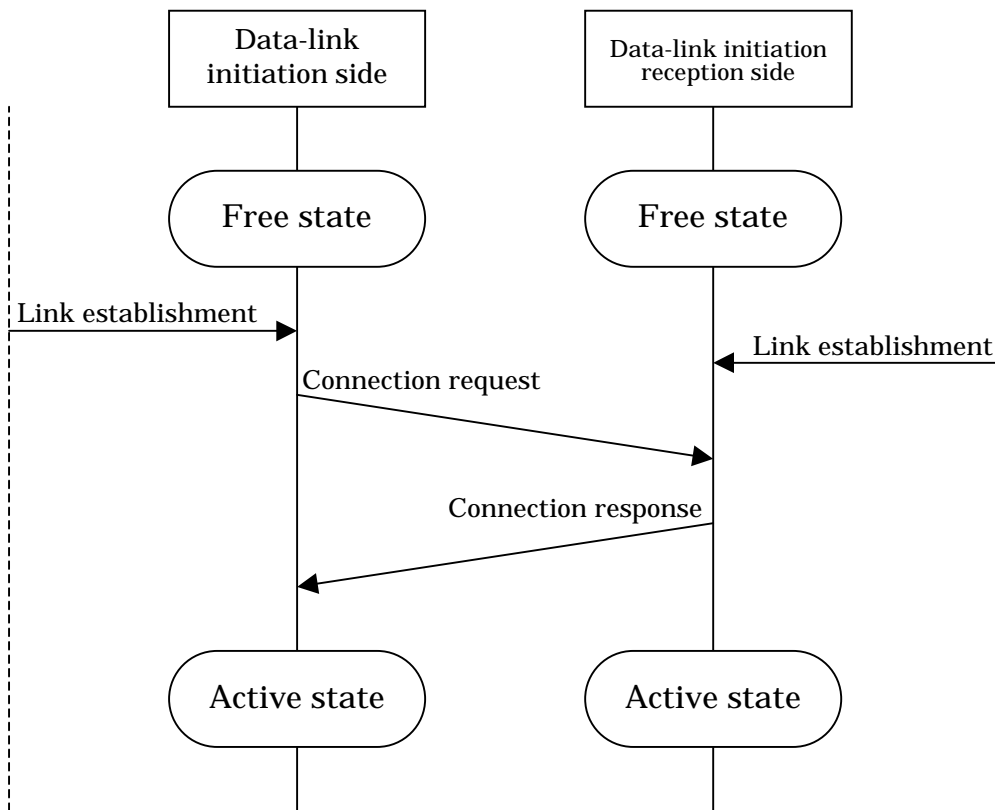


Fig. 4.5.1. New connection sequence

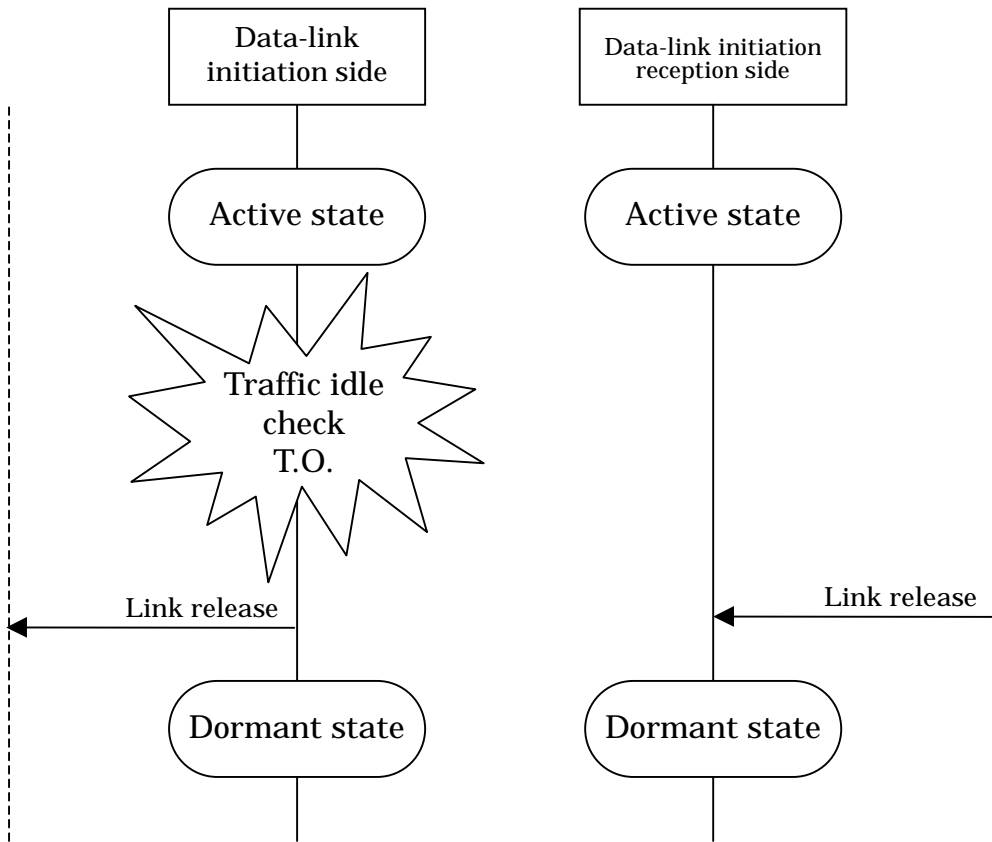


Fig. 4.5.2. Temporary disconnection sequence

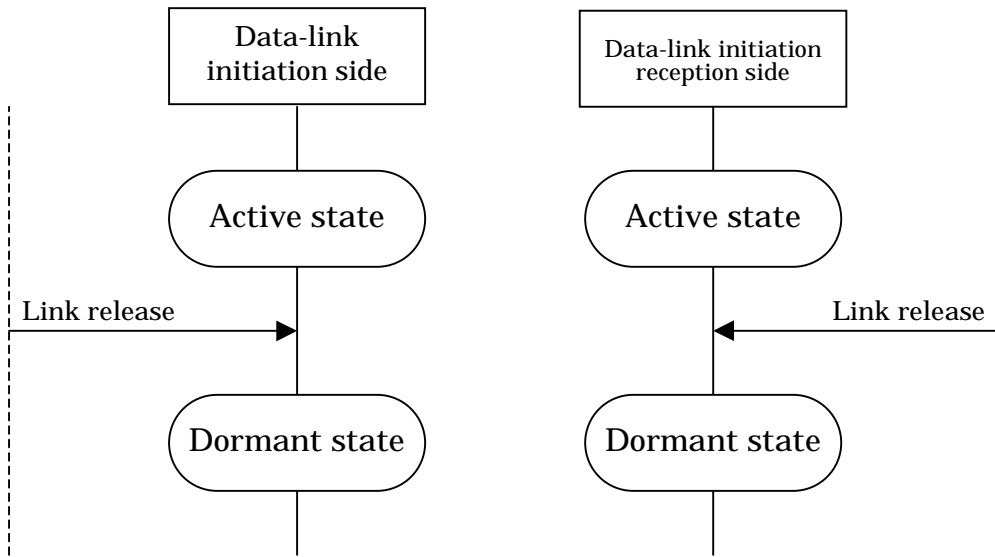


Fig. 4.5.3. Unexpected disconnection sequence

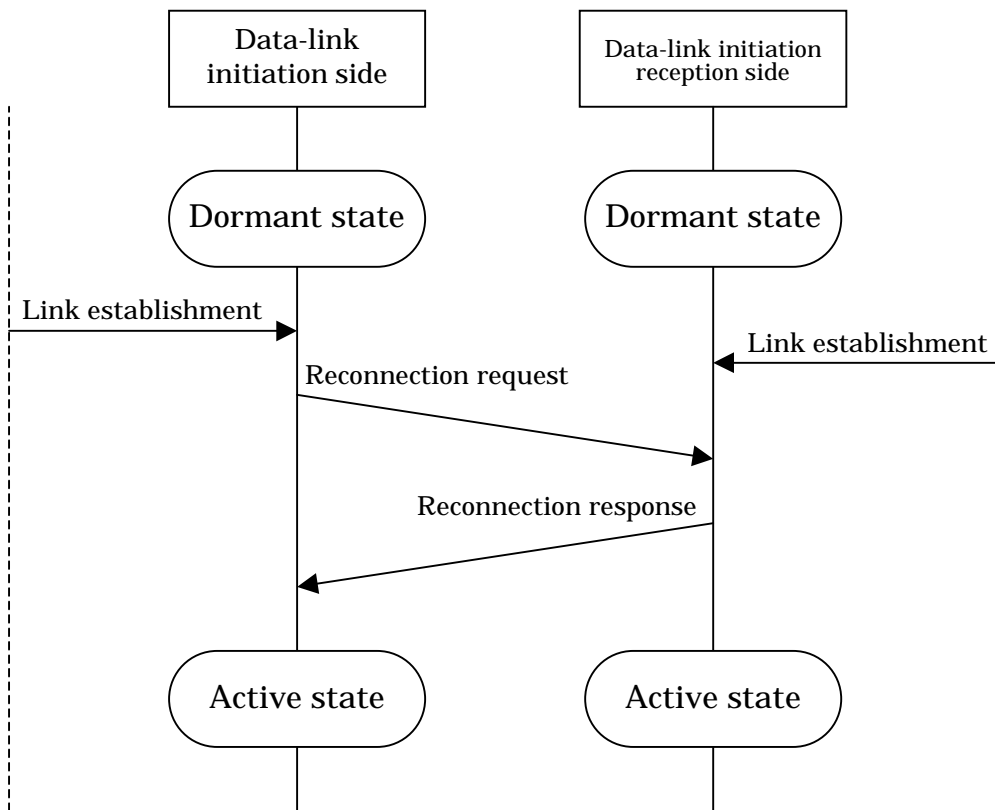


Fig. 4.5.4. Reconnection sequence

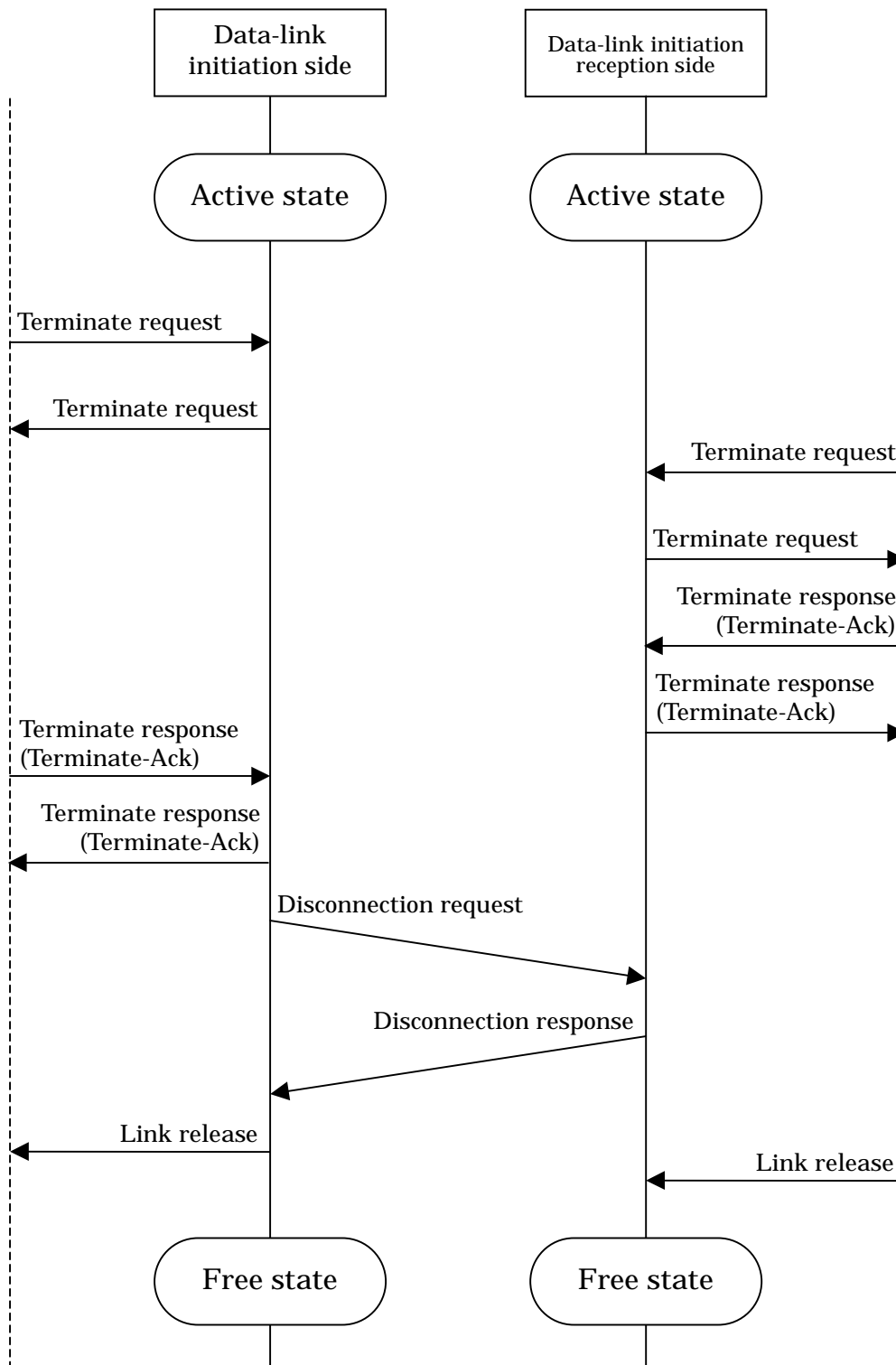


Fig. 4.5.5. Permanent disconnection sequence from the data-link initiation side

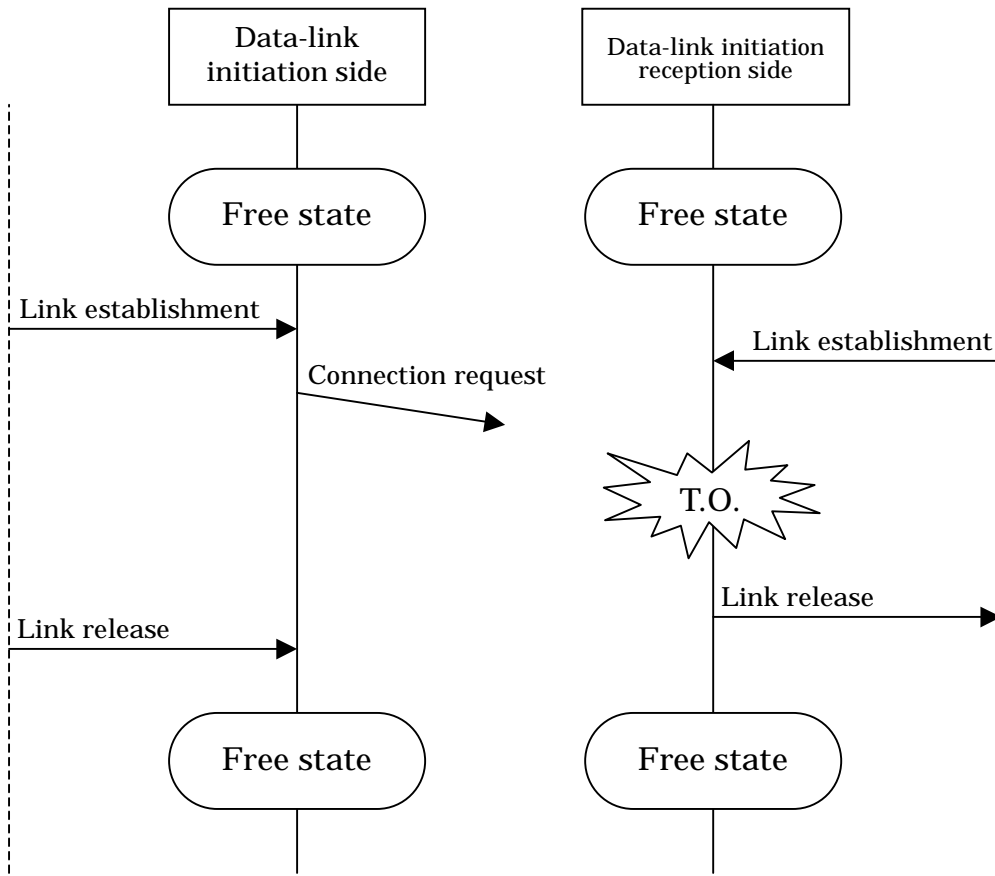


Fig. 4.5.6. New connection- connection request wait T.O. sequence

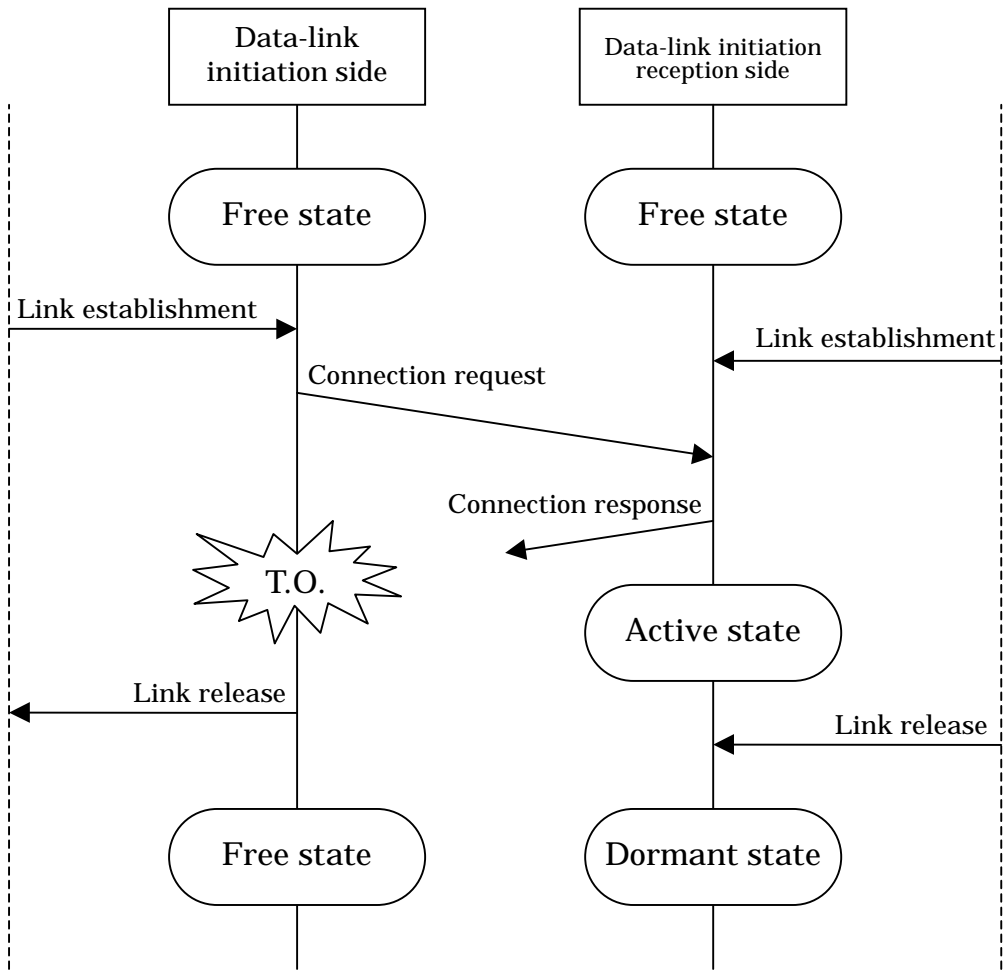


Fig. 4.5.7. New connection- connection response wait T.O. sequence

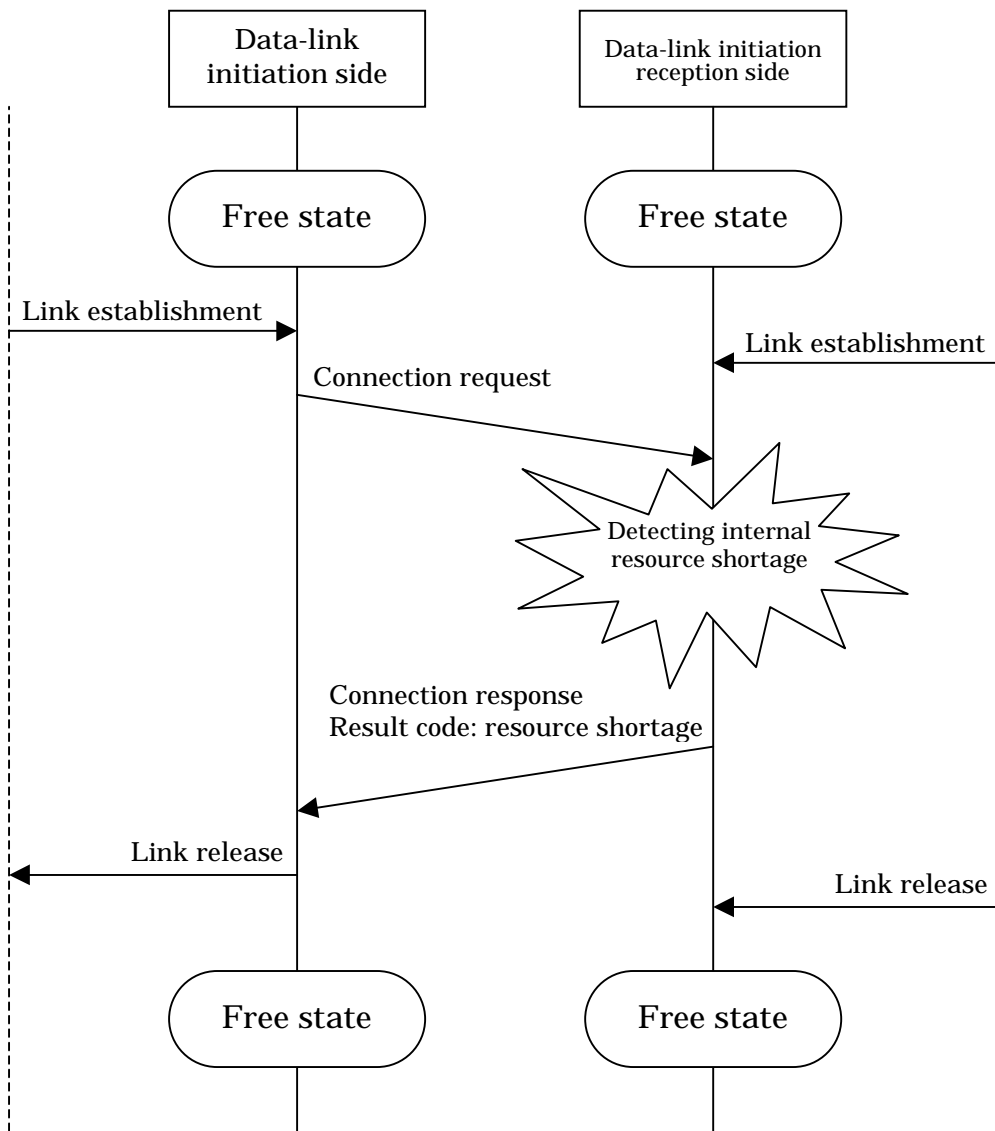


Fig. 4.5.8. New connection-detecting internal resource shortage sequence

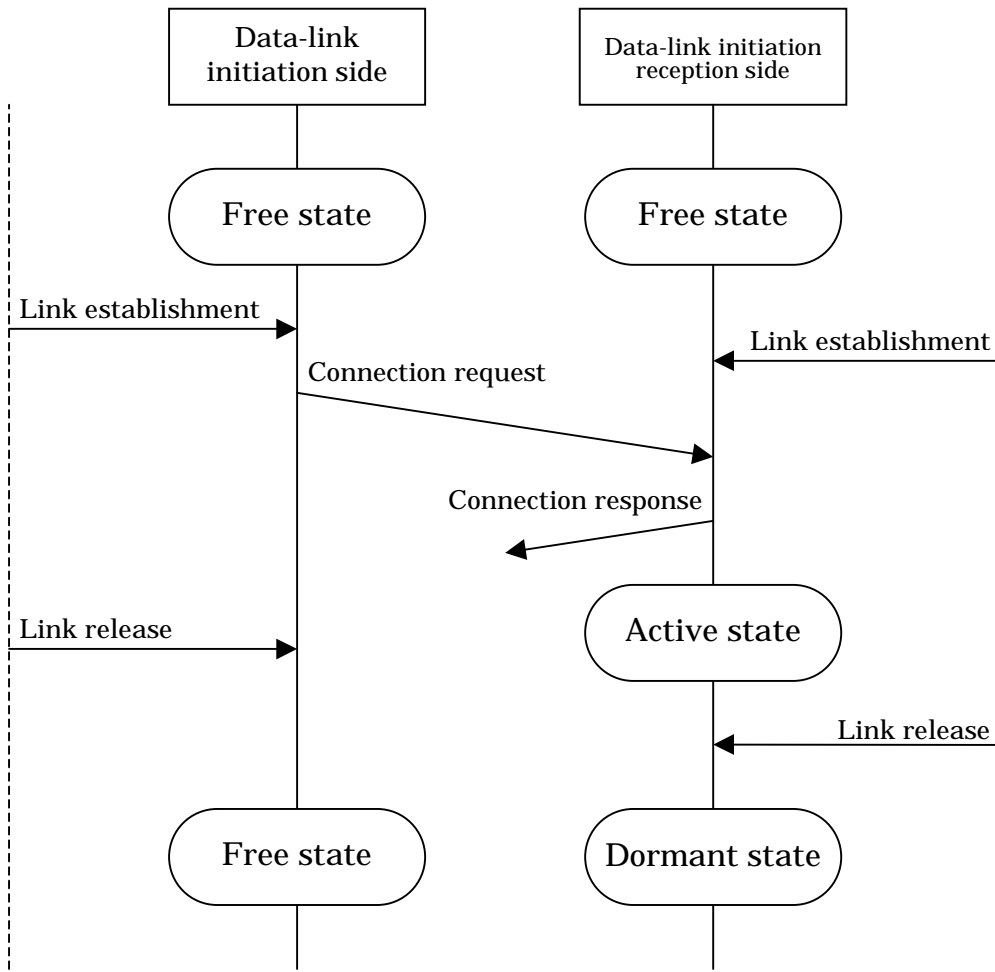


Fig. 4.5.9. New connection-connection response wait disconnection sequence

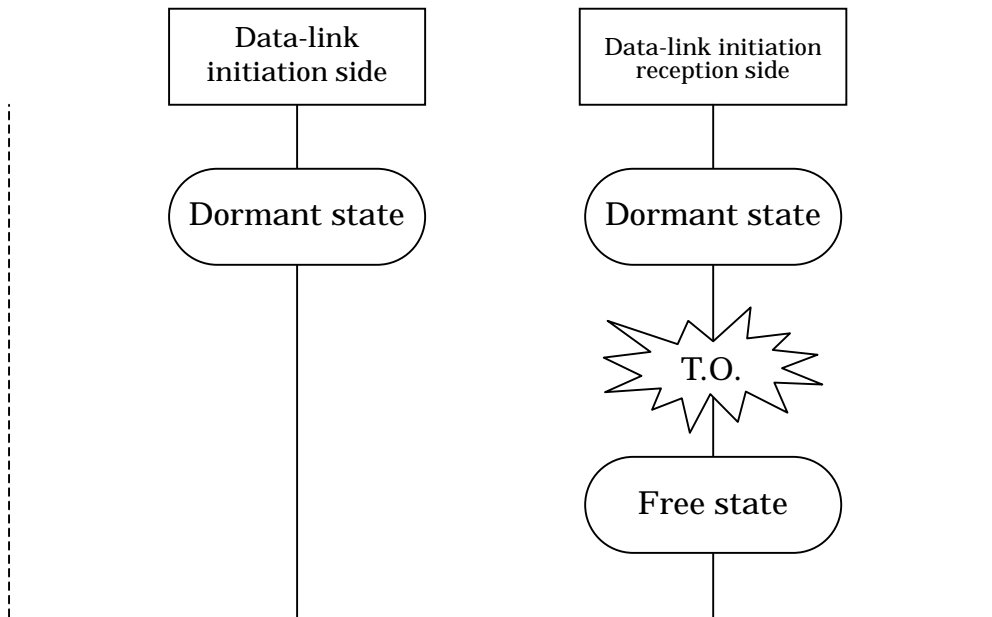


Fig. 4.5.10. Temporary disconnection-data-link preservation timer T.O. sequence

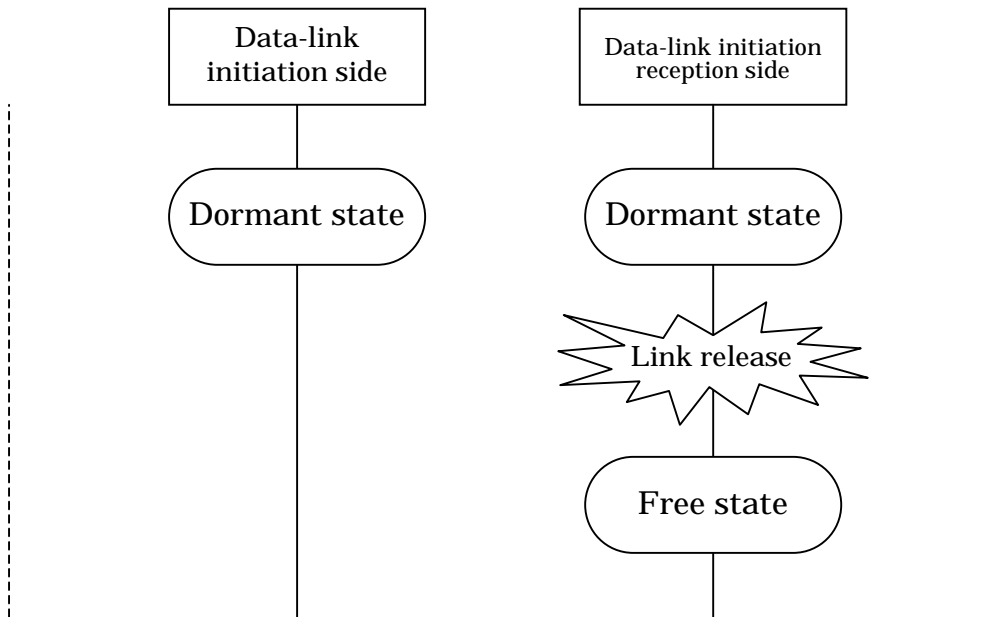


Fig. 4.5.11. Temporary disconnection-data-link disconnection sequence

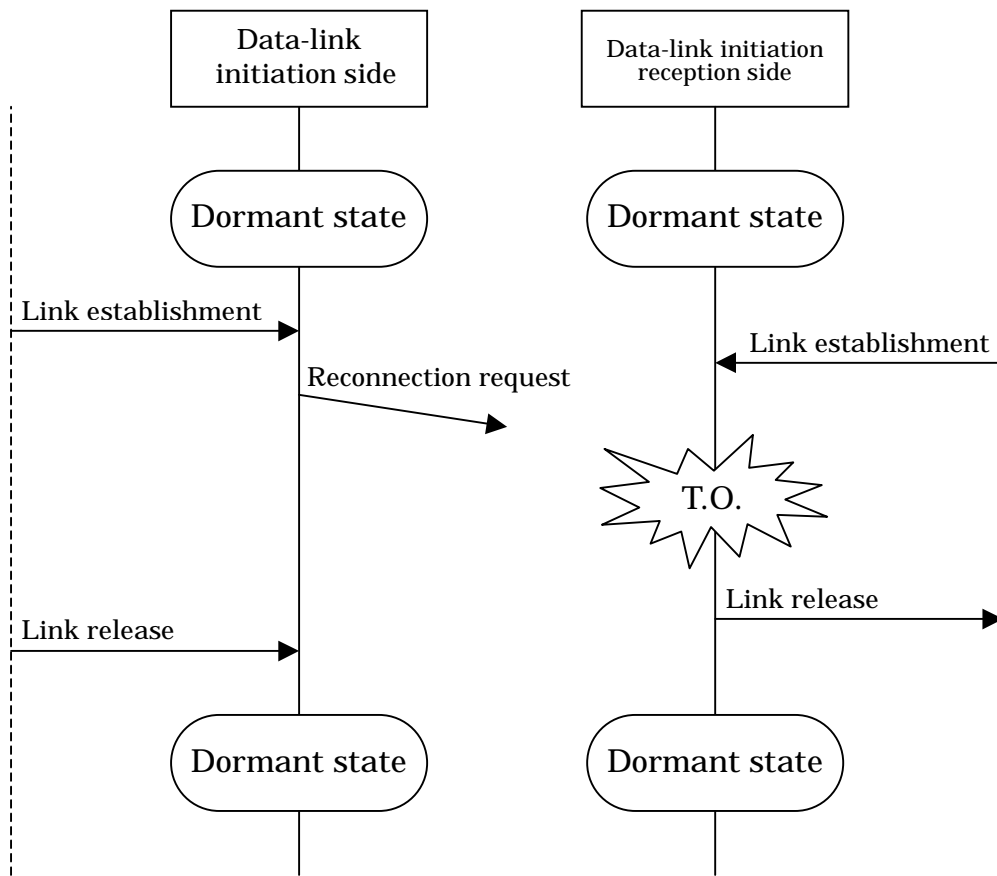


Fig. 4.5.12. Reconnection-reconnection request wait T.O. sequence

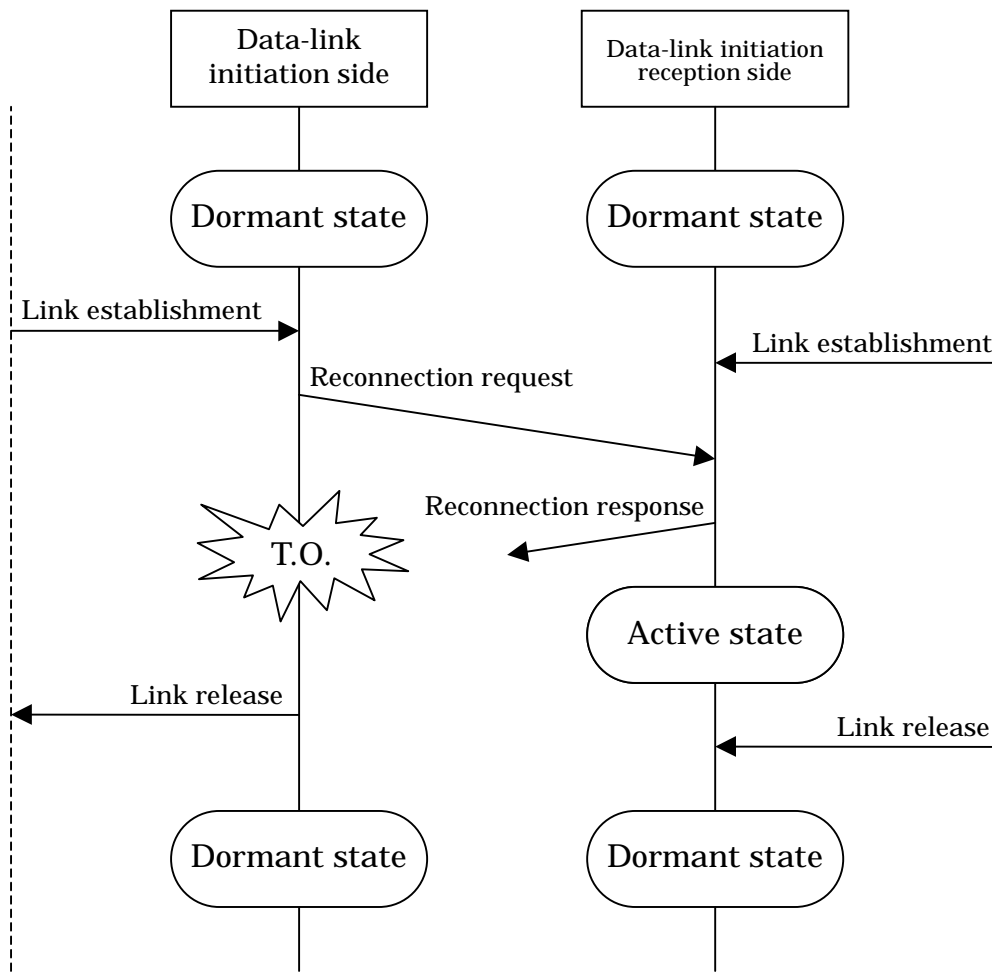


Fig. 4.5.13. Reconnection-reconnection response wait T.O. sequence

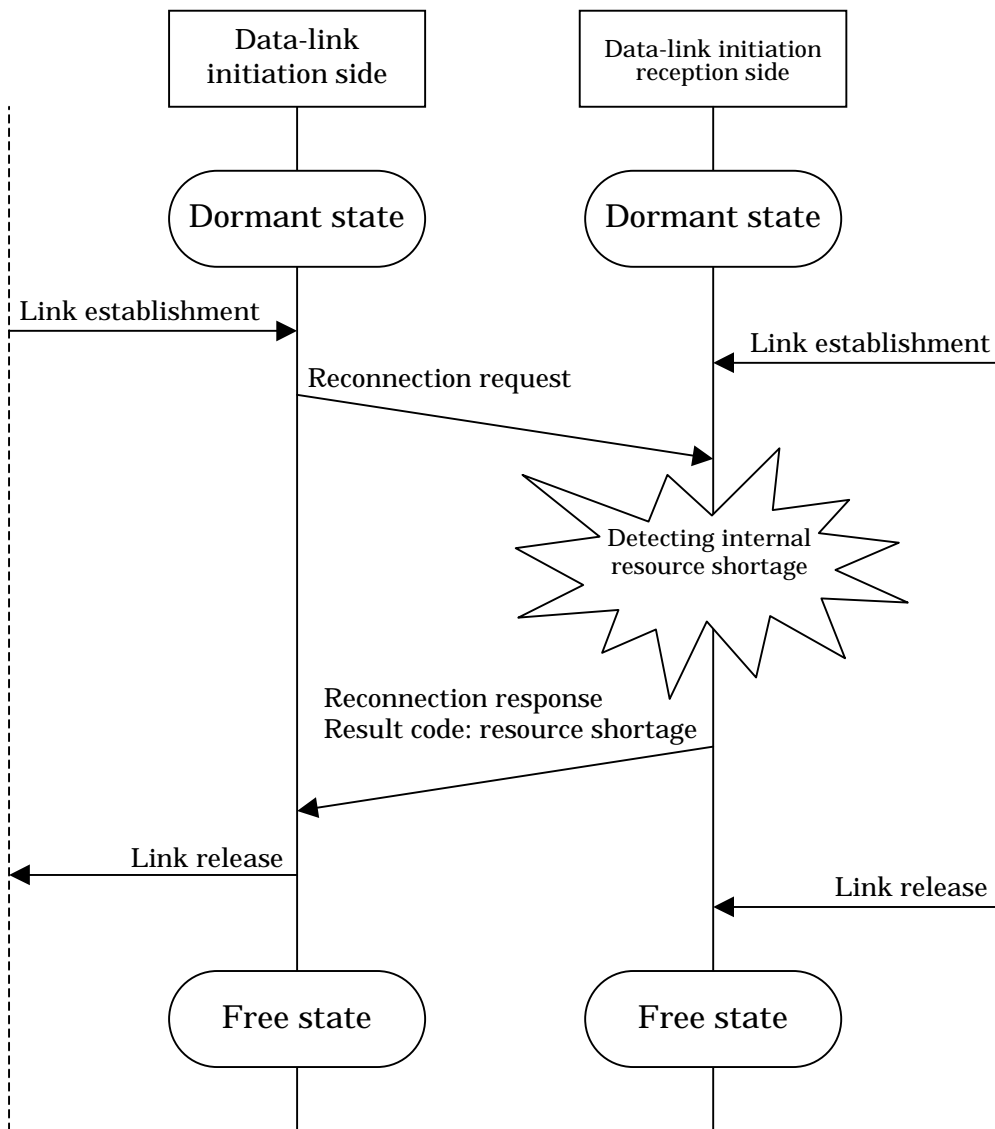


Fig. 4.5.14. Reconnection-detecting internal resource shortage sequence

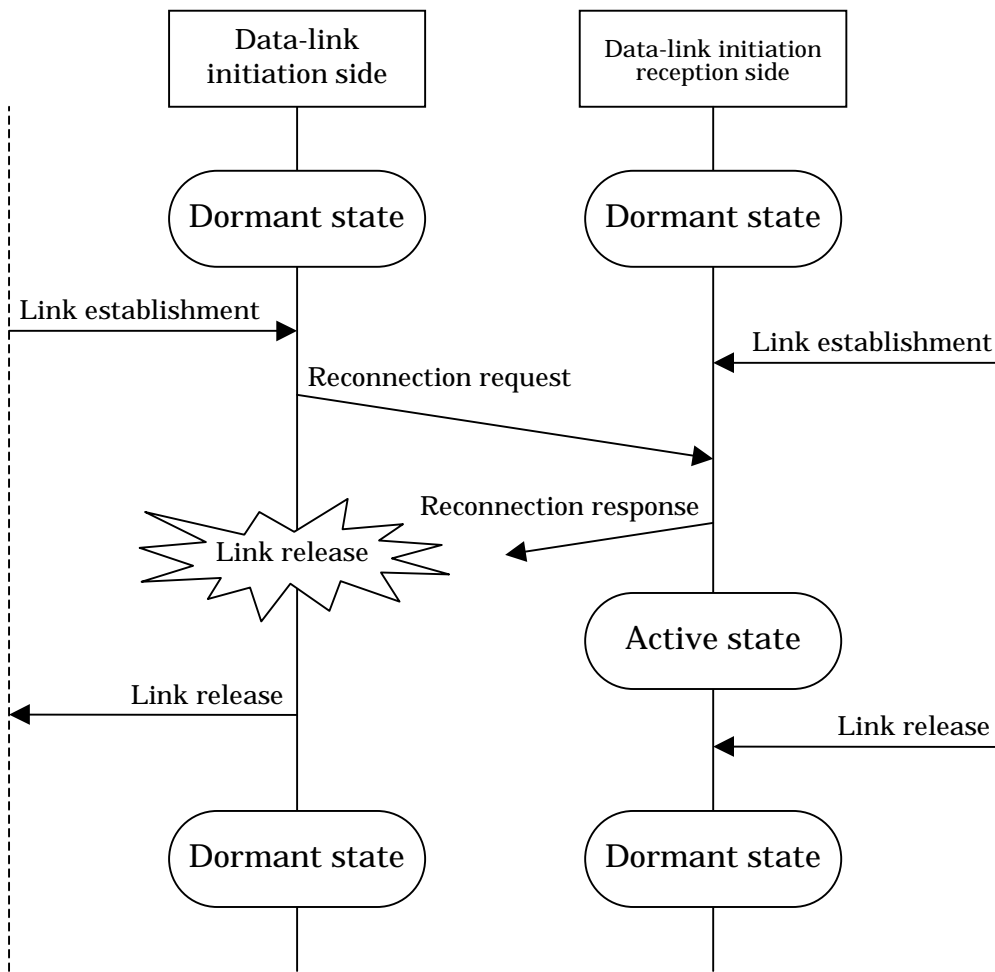


Fig. 4.5.15. Reconnection-reconnection response wait data-link disconnection sequence

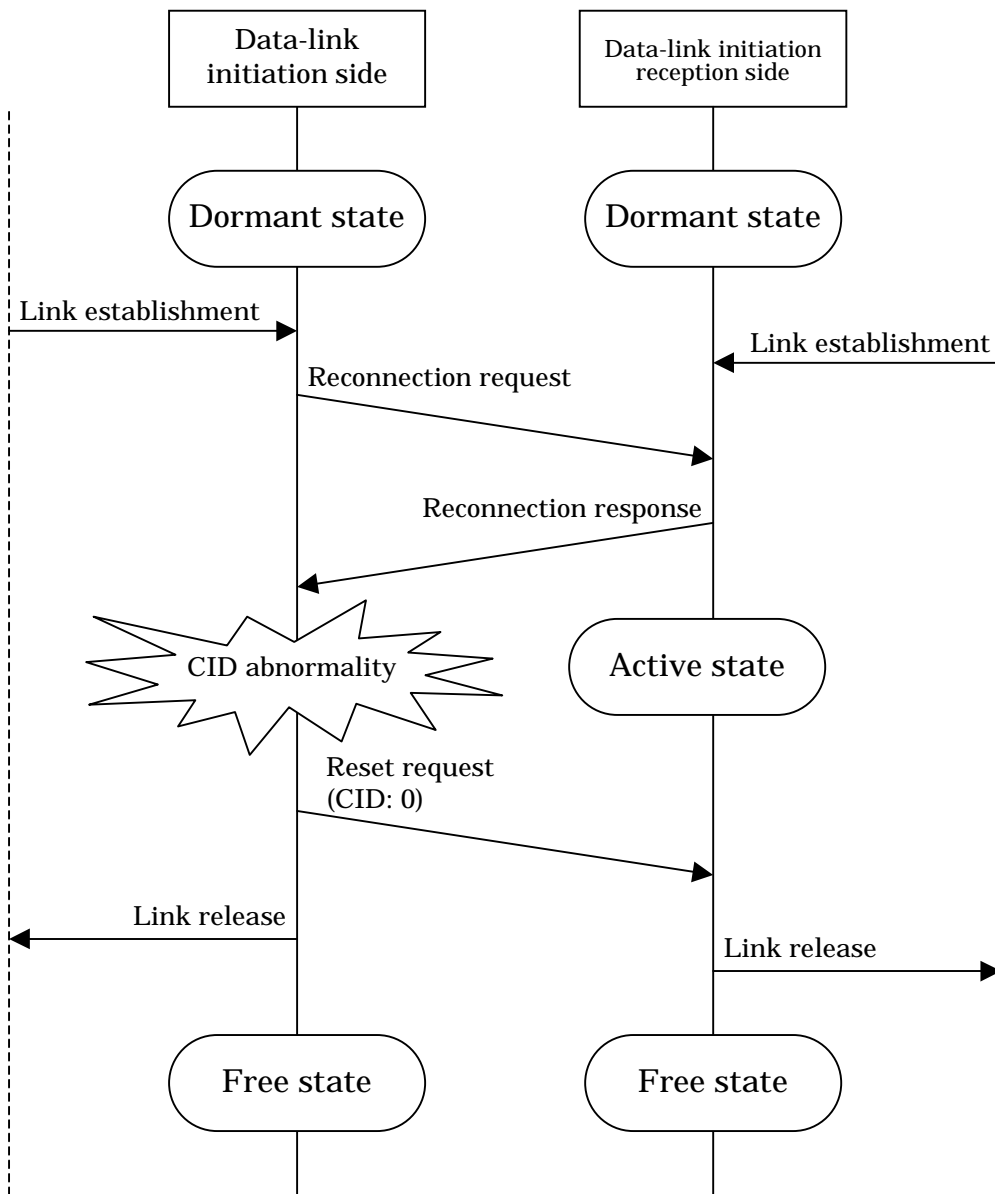


Fig. 4.5.16. Reconnection-data-link initiation side CID abnormality sequence

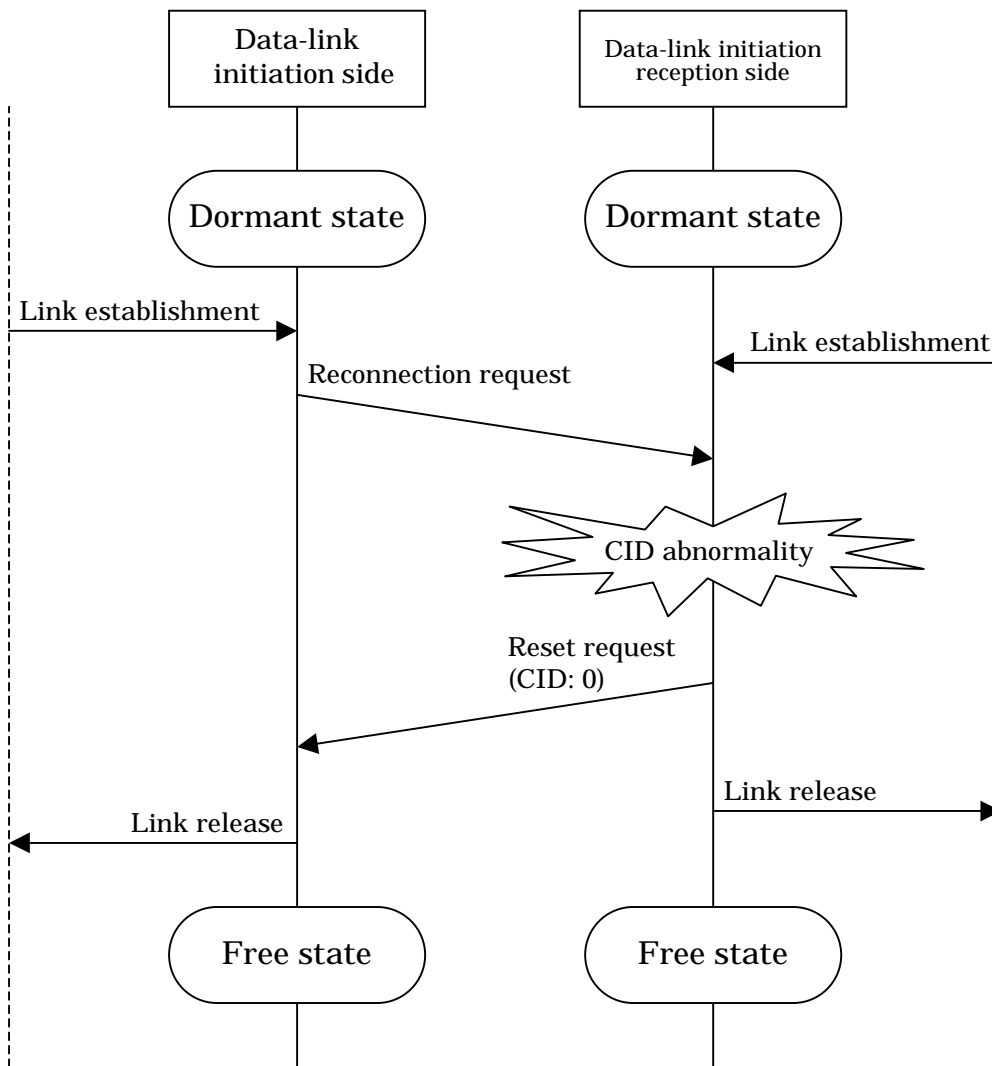


Fig. 4.5.17. Reconnection-data-link initiation reception side CID abnormality sequence

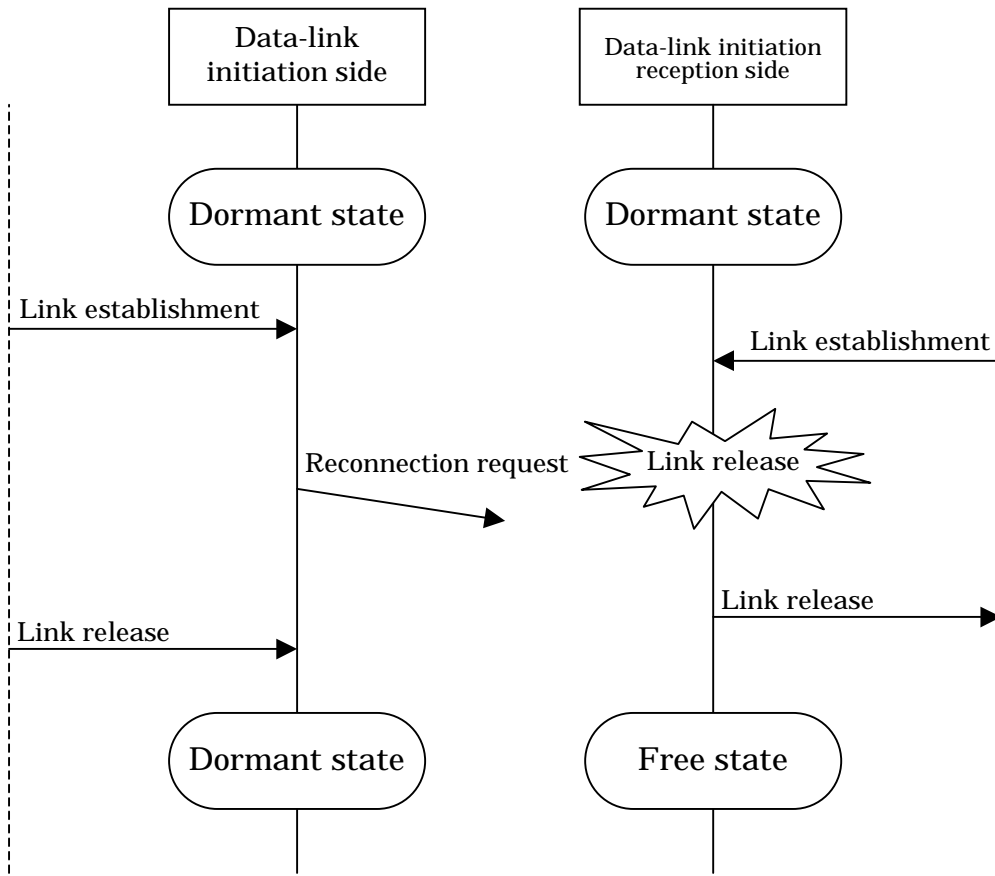


Fig. 4.5.18. Reconnection-reconnection request wait disconnection sequence

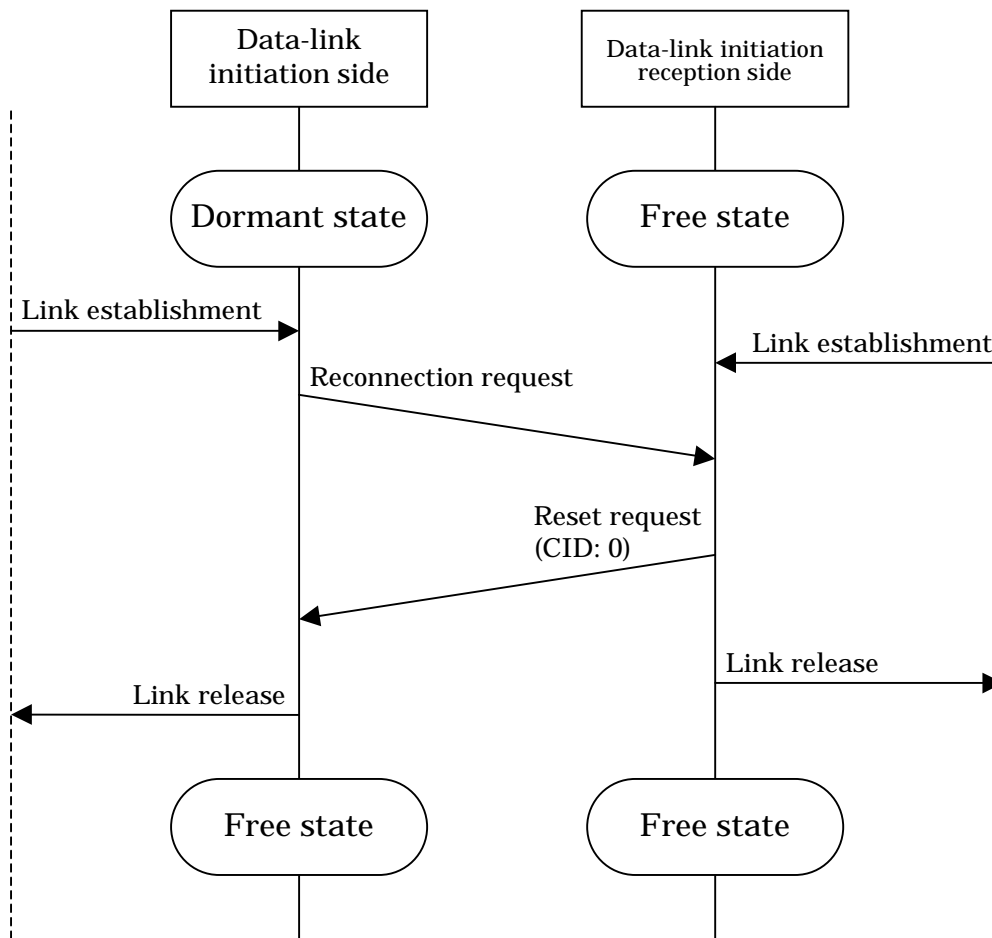


Fig. 4.5.19. State incompatibility (data-link initiation side: temporary disconnection; data-link initiation reception side: idle) sequence

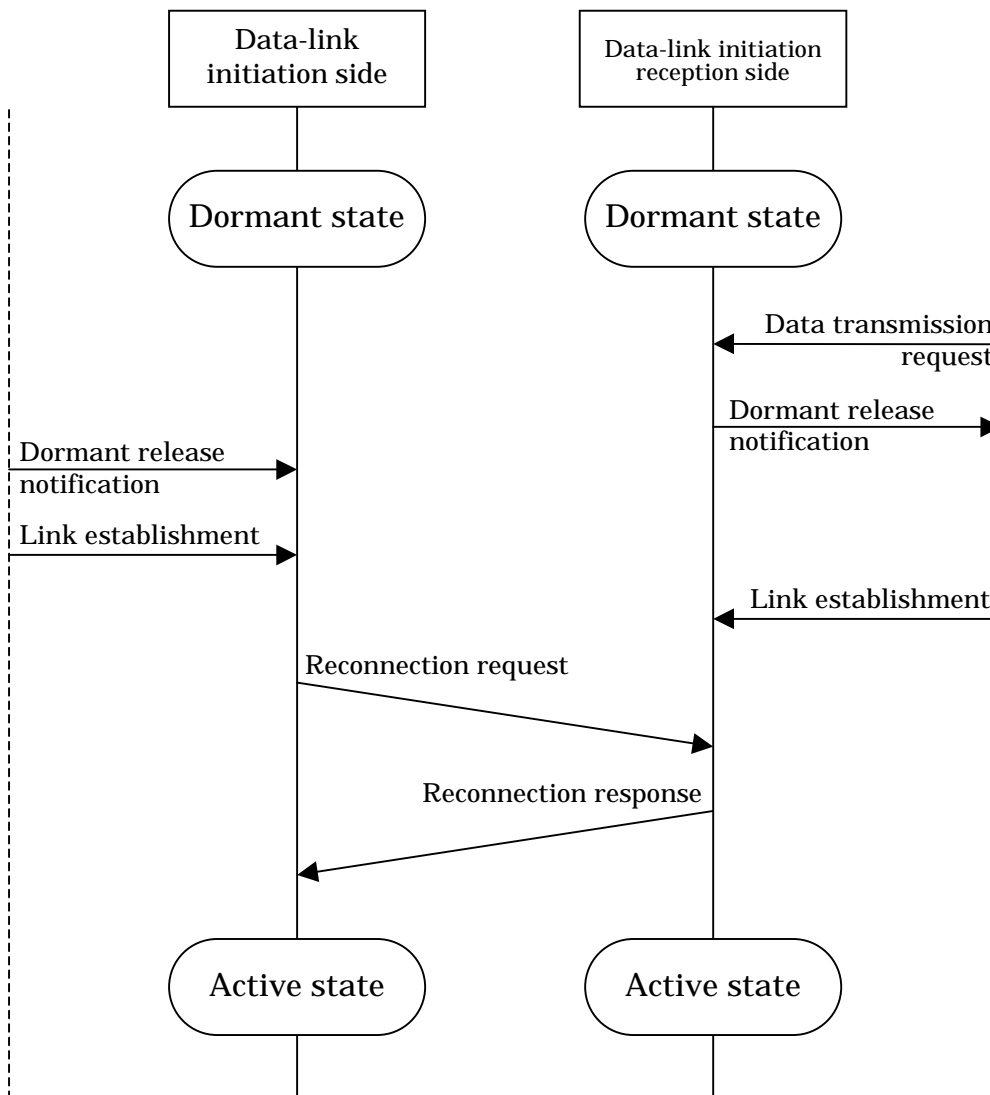


Fig. 4.5.20. Reconnection from dormant release sequence

- 5. MITF dial-up dormant state transition
 - 5.1. Data-link initiation side
 - 5.1.1. Data-link initiation side state transition

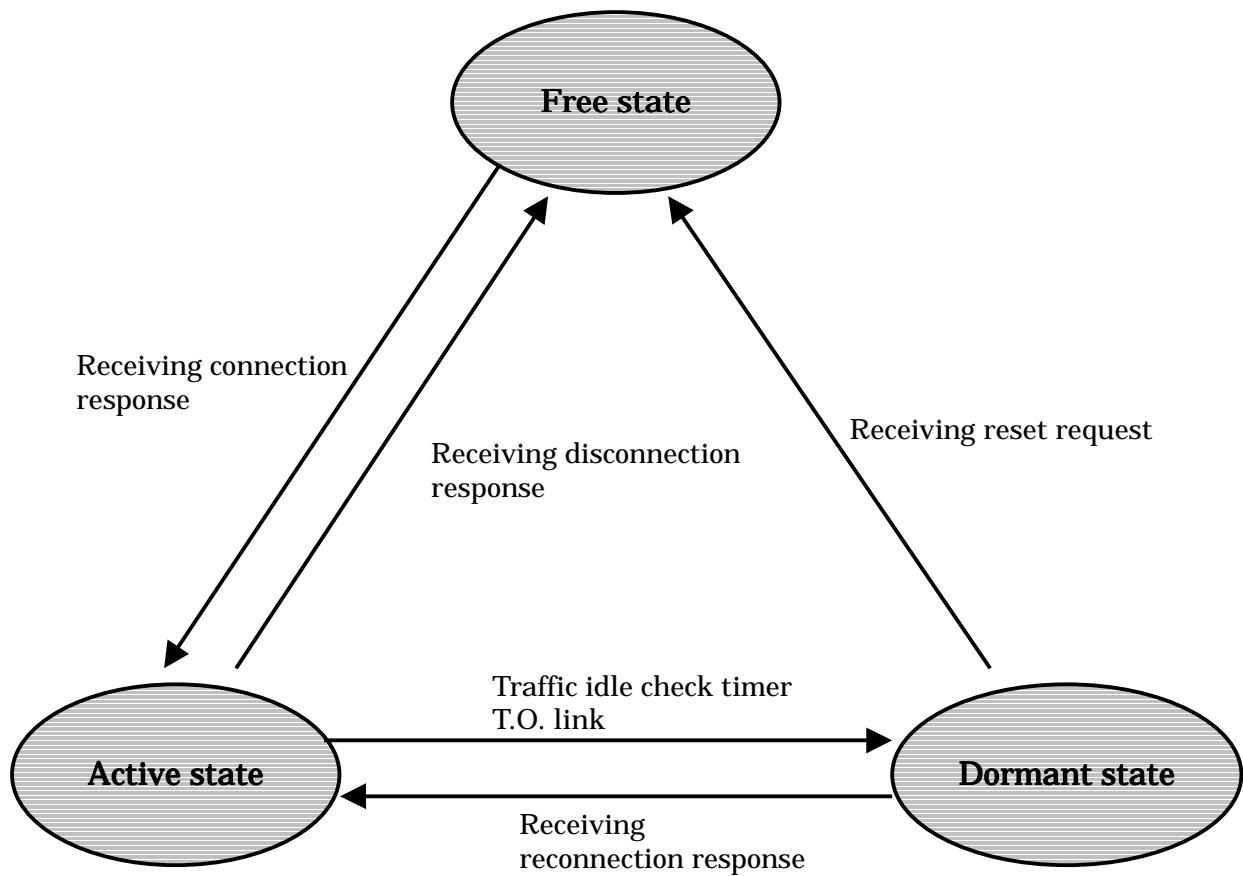
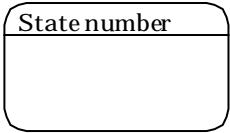
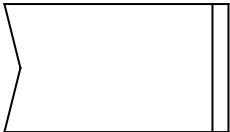


Fig. 5.1.1. State transition of data-link initiation side (normal system only)

5.1.2. Data-link initiation side SDL



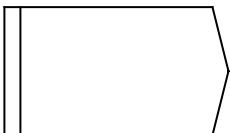
: State



: Primitive from a lower level than PIAFS dormant procedure



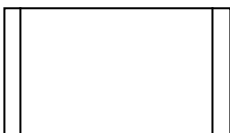
: Primitive to a lower level than PIAFS dormant procedure



: Primitive to a higher level than PIAFS dormant procedure



: Primitive from a higher level than PIAFS dormant procedure



: Procedure call

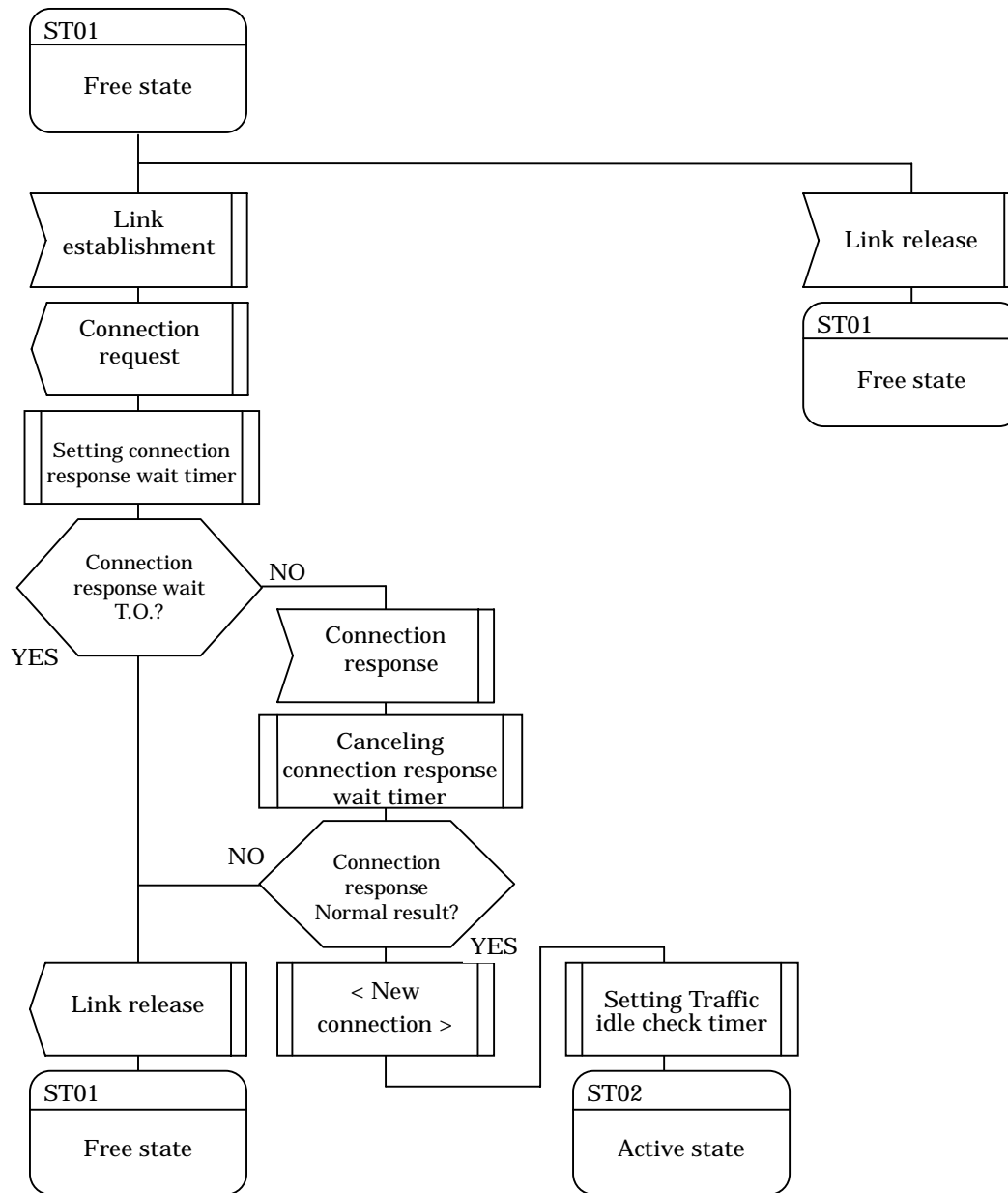


Fig. 5.1.2. (1) Data-link initiation side SDL

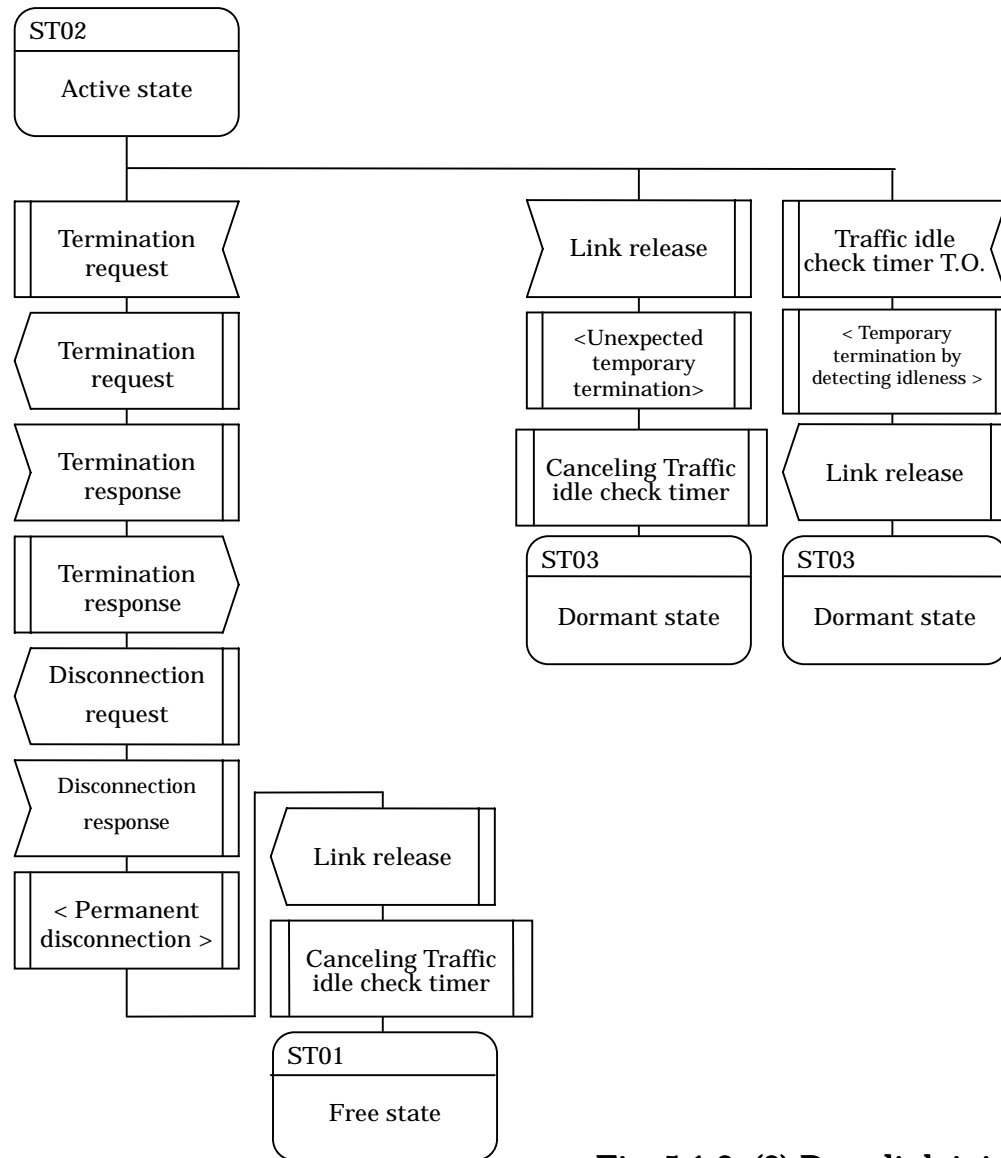


Fig. 5.1.2. (2) Data-link initiation side SDL

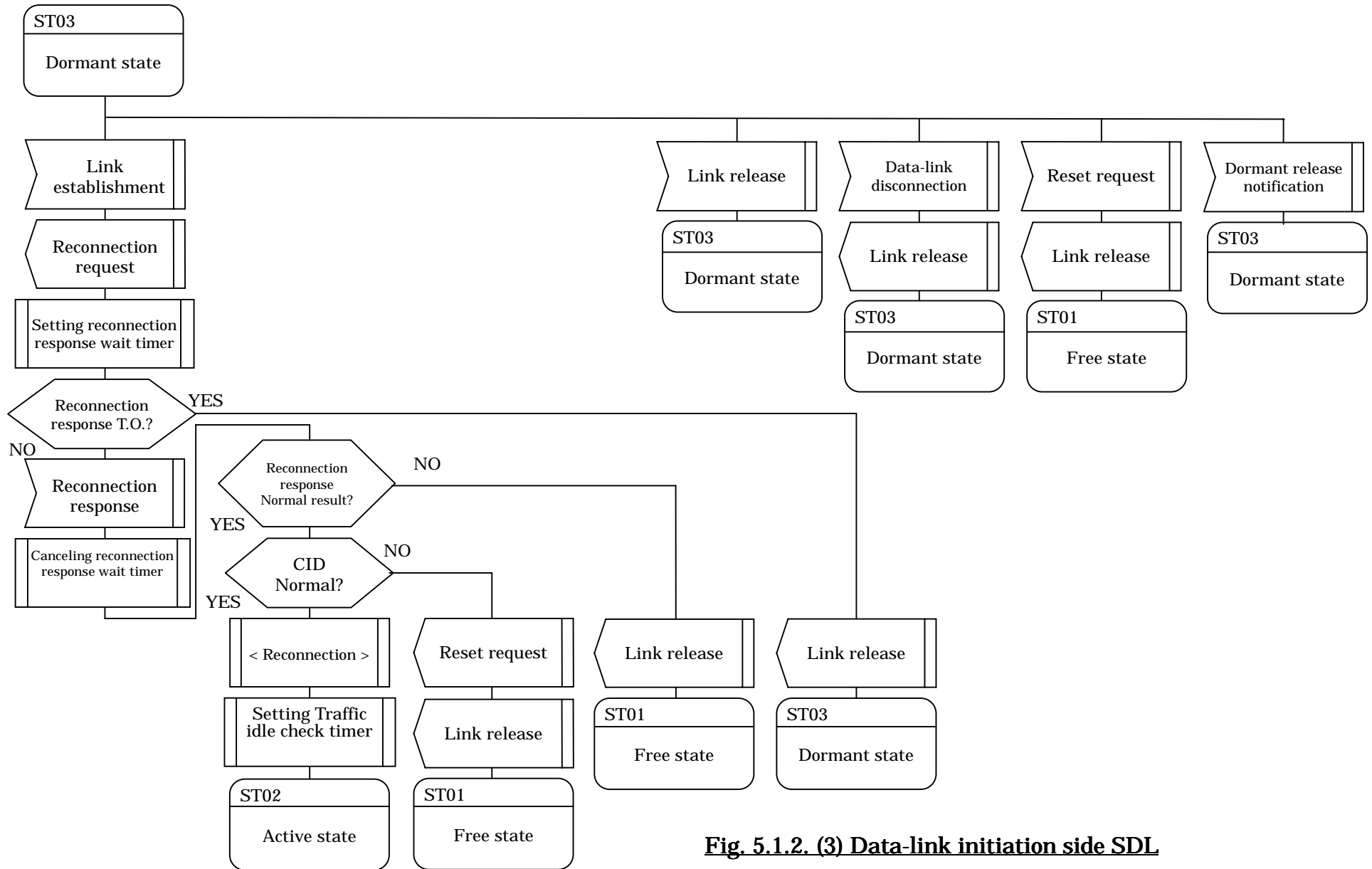


Fig. 5.1.2. (3) Data-link initiation side SDL

5.1.3. Data-link initiation side timer values

Timer values of data-link initiation side are as follows:

Table 5.1.3. Timer values

Name of timer	Use
Connection response wait timer	Used for controlling timer for the time between sending connection request primitive to the data-link initiation reception side and receiving connection response primitive from the data-link initiation reception side, when the state of the data-link initiation side is free.
Reconnection response wait timer	Used for controlling timer for the time between sending reconnection request primitive to the data-link initiation reception side and receiving reconnection response primitive from the data-link initiation reception side, when the state of the data-link initiation side is free.
Traffic Idle check timer	Used for releasing link whose level is lower level than MITF dial-up dormant procedure, when the communication between the data-link initiation side and the data-link initiation reception side is idle for a certain period of time.

5.1.3.1. Connection response wait timer

Since the timer value differs by transition control functions such as PIAFS or ISDN applying MITF dial-up dormant protocol, this specification does not define the value.

5.1.3.2. Reconnection response wait timer

Since the timer value differs by transition control functions such as PIAFS or ISDN applying MITF dial-up dormant protocol, this specification does not define the value.

5.1.3.3. Traffic Idle check timer

In principle, the data-link initiation side has to check idleness in value indicated by the data-link initiation reception side.

The data-link initiation side is allowed to check idleness at lower value than indicated by the data-link initiation reception side. However, the data-link initiation side cannot set timer value higher than indicated by the data-link initiation reception side or stop the function.

When used in PIAFS, the standard is set that the timer value is below 90 seconds.

5.1.4. Data-link initiation side primitives

Table 5.1.4. Data-link initiation side -> Data-link initiation reception side

Primitive	Meaning
Connection request	Starting of MITF dial-up dormant function
Disconnection request	Termination of MITF dial-up dormant function
Reconnection request	Re-start of MITF dial-up dormant function
Reset request	Reset of MITF dial-up dormant function

5.2. Data-link initiation reception side

5.2.1. Data-link initiation reception side state transition

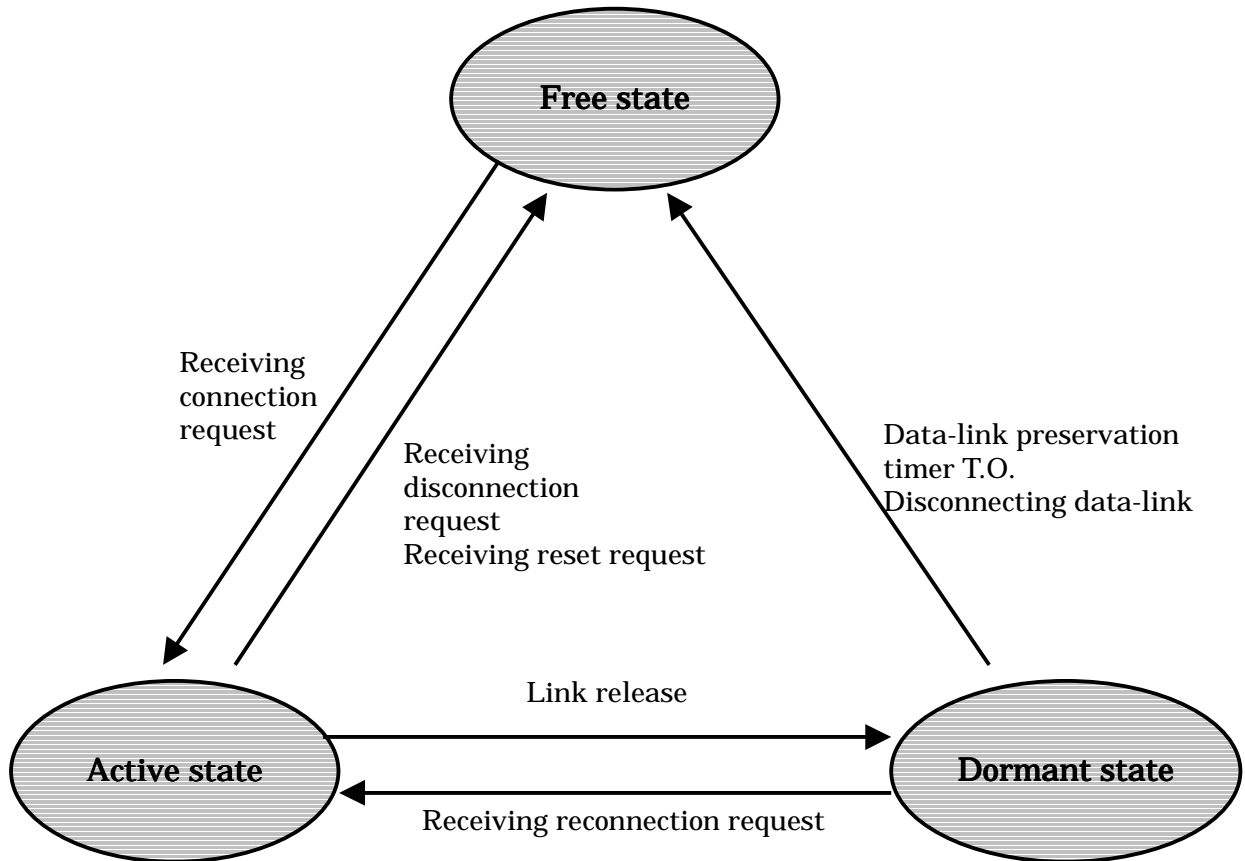


Fig. 5.2.1. State transition of data-link initiation reception side (normal system only)

5.2.2. Data-link initiation reception side SDL

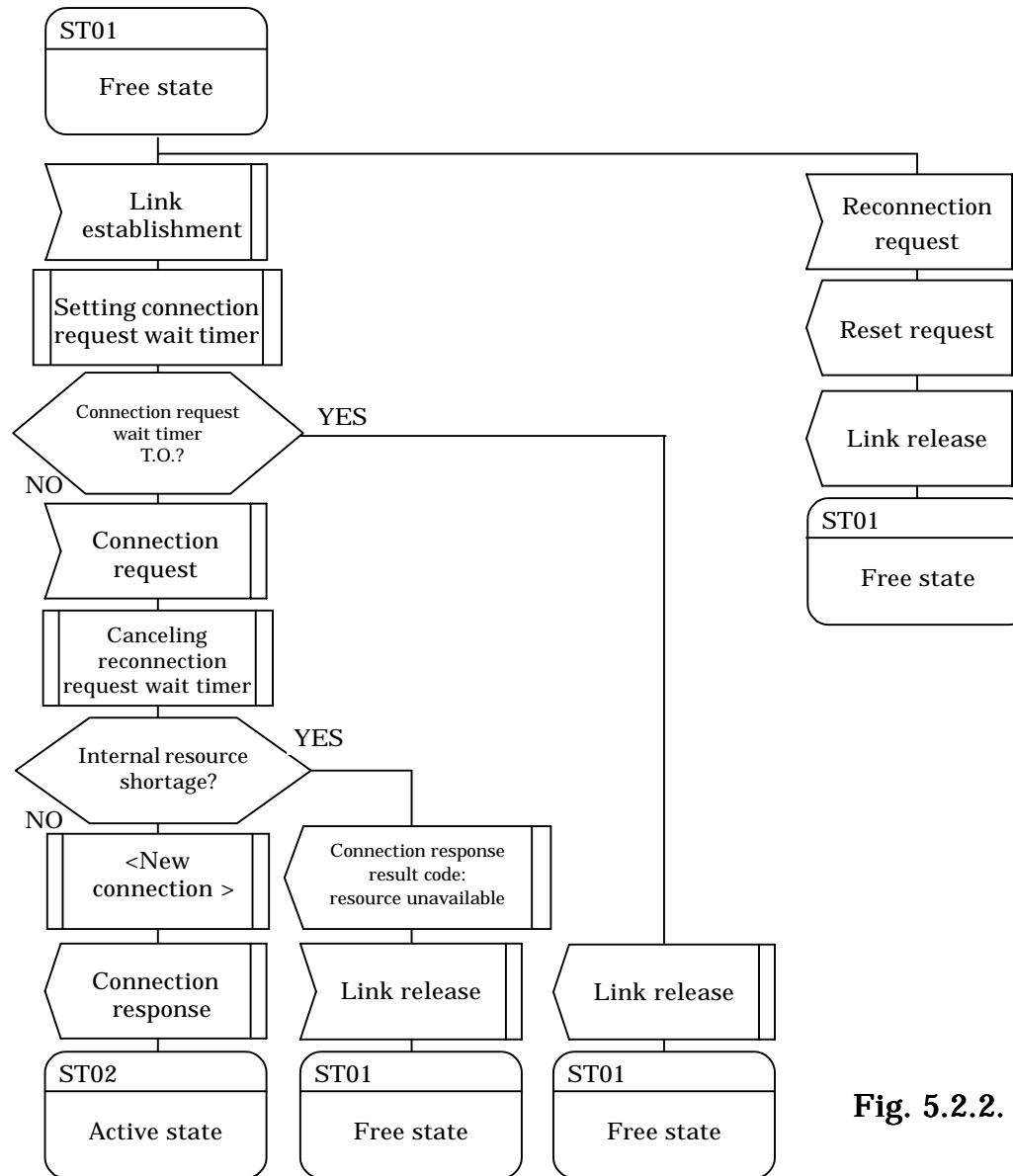


Fig. 5.2.2. (1) Data-link initiation reception side SDL

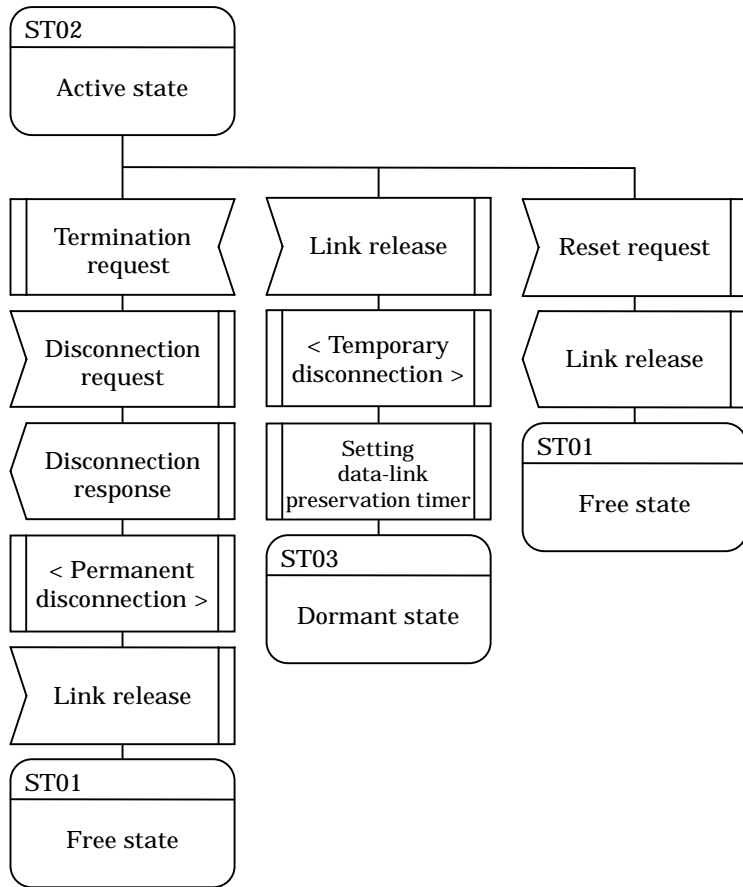


Fig. 5.2.2. (2) Data-link initiation reception side SDL

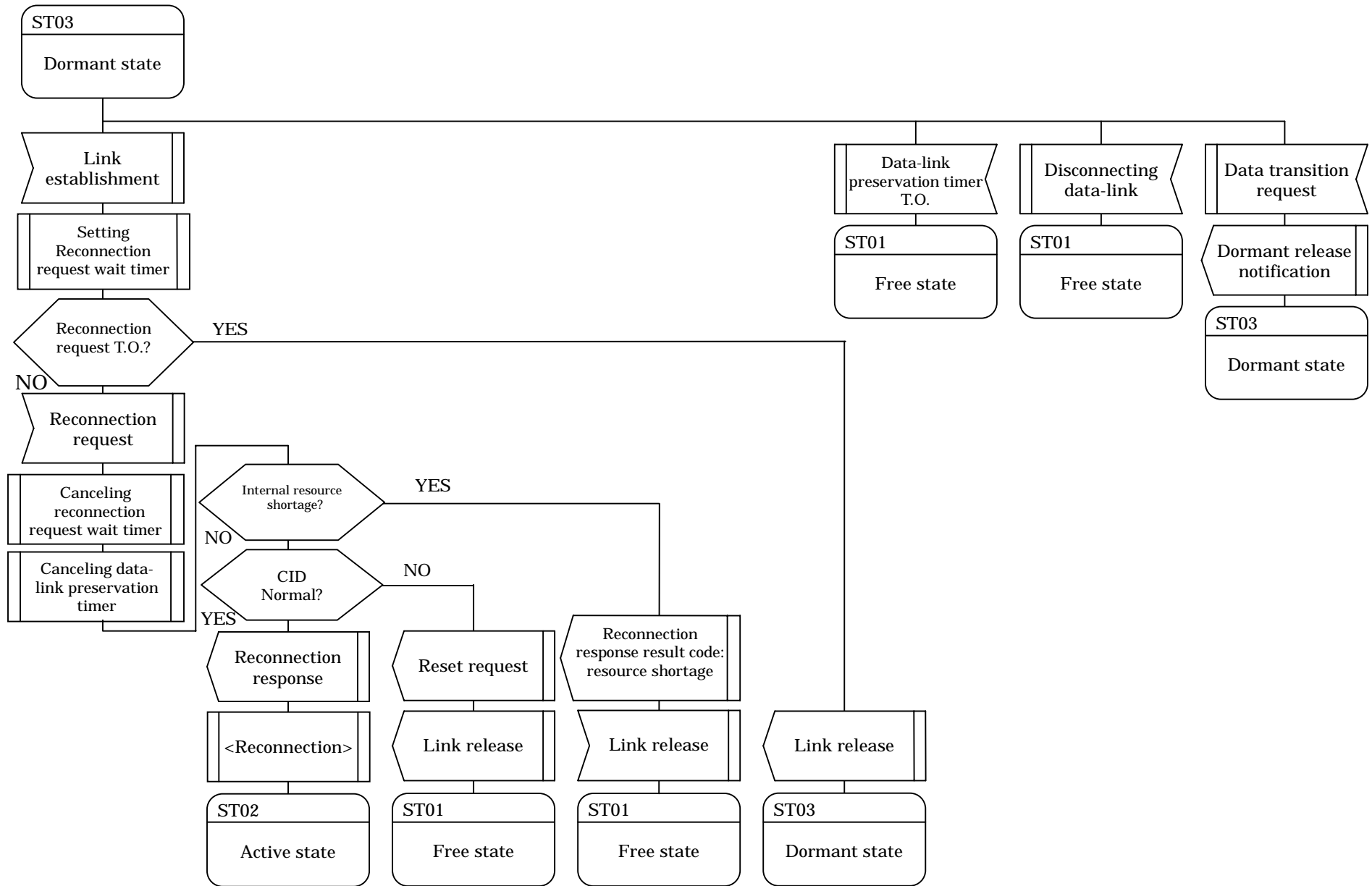


Fig. 5.2.2. (3) Data-link initiation reception side SDL

5.2.3 Data-link initiation reception side timer values

Table 5.2.3. Timer values

Name of timer	Use
Connection request wait timer	Used for controlling time for the time between receiving notification that link is established from lower level than MITF dial-up dormant procedure and receiving connection request primitive from the data-link initiation side, when the state of the data-link initiation reception side is free.
Reconnection request wait timer	Used for controlling time for the time between receiving notification that link is established from lower level than MITF dial-up dormant procedure and receiving reconnection request primitive from the data-link initiation side, when the state of the data-link initiation reception side is dormant.
Data-link preservation timer	Used for releasing data-link in case dormant state in MITF dial-up dormant procedure persists for a certain period of time.

5.2.3.1. Connection request wait timer

This timer value depends on the data-link connection side, the data-link initiation reception side and transition speed. As a standard, the timer value is below 20 seconds.

5.2.3.2. Reconnection request wait timer

This timer value depends on the data-link connection side, the data-link initiation reception side and transition speed. As a standard, the timer value is below 20 seconds.

5.2.3.3. Data-link preservation timer

Since this timer value differs by users of MITF dial-up dormant protocol, this specification does not define it.

5.2.4. Data-link initiation reception side primitives

Table 5.2.4. Data-link initiation reception side -> Data-link initiation side

Primitive	Meaning
Connection response	Response to start of MITF dial-up dormant function
Disconnection response	Response to termination of MITF dial-up dormant function
Reconnection response	Response to restart of MITF dial-up dormant function
Reset request	Reset of MITF dial-up dormant function