PHS MoU Document
C-IF3.04-02-TS

Title:	PHS-FWA (Personal Handy-phone System - Fixed Wireless Access) System : Interface Specification between FWA access Controller and Service Node - Bellcore GR-303 Core interface-
Version:	02
Date:	June 7, 2000

PHS MoU Classification: Unrestricted

List of contents:

The clauses marked by * are not included in this specification.

Number of pages: 38

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History of Revised Versions

Version	Date	Outline
01	July 11, 1997	Established
02	June 7, 2000	Changed all WLL into FWA.

C-IF 3.04-02-TS

PHS-FWA(Personal Handy-Phone System-Fixed Wireless Access)System:
Interface Specification between FWA Access Controller and Service Node
-Bellcore GR-303-CORE Interface-
<SUMMARY>

1. General

This specification describes about Integrated Digital Loop Carrier system interface between WAC and SN.

2. Differences from Bellcore GR-303-CORE

The differences from Bellcore GR-303-CORE are summarized in the following table.(Table S-1/C-IF3.04)

The following specification have been added to Bellcore GR-303-CORE.

(1) SDH transmission specification between WAC and SN

The following service features have been deleted from Bellcore GR-303-CORE.

(1) Multi-party message telephone service
(2) Digital data system(DDS) service
(3) Non-locally/non switched service
(4) ISDN Basic Rate and primary service
(5) Digital bridging
(6) Universal channel unit
(7) DS1 extensions

The following specifications have been deleted from Bellcore GR-303-CORE.

(1) Line Interface specifications
(2) Hybrid signaling
(3) Operation Interfaces (exclude line testing)
(4) Craftsperson interface (clause 7)
(5) Integrated digital loop carrier(IDLC) administration (clause 8)
(6) System turn-up (clause 9)
(7) Miscellaneous (clause 10)
(8) IDLC system transition considerations (clause 11)

The terminologies like as “RDT” and “LDS” are replaced to “WAC” and “SN” respectively. “IDT” is considered to element of SN

3. Comments for implementation

It depends on operating company’s study to modify of these implementations according to latest advanced technology, or to add some requirements according to national protocol.
This clause also shows example of sequence on GR-303-CORE interface (see Annex A).

4. References

Bellcore Generic Requirement GR-303-CORE

5. Items for further study

It is under study to include items, which are not included in the minimum set specification at present but specified in GR-303-CORE, in ISDN protocol specifications as many as possible in near future.

Table S-1/C-IF3.04 Differences from Bellcore GR-303-CORE(1/5)

Preface	•Preface is not included
1.1 Purpose	• In physical layer SDH interface is included as optional specification.
1.3.1 End to end system requirements summary	• Functional equivalence of DS0 subscriber main frame access is not included. • Requirements to interface customer access lines are not included. • ISDN Basic Rate and primary rate access is not included
1.3.2 Generic IDLC interface Requirements summary	• SDH interface is included as optional specification. • Operation related function and EOC are not included. • ISDN is not included.
1.3.3 Miscellaneous Items	• Miscellaneous items are not included
1.4 Key Bellcore documents	• Key Bellcore document is not included
1.5 Application of IDLC	• Application of IDLC is not included
1.6 Differences from TR-303	• Differences from TR-303 is not included
1.7 Organization of document	• Clause 7 to 11 are not included.
2.1.1 RDT	• Line interface function is not included and WCS interface function is needed. • Provisioning and maintenance is not included.
2.1.4 INA	• INA is not included
3.1 Summary of required and optional service capabilities	• Loop start, ground start and loop reverse battery circuit is not included. • Non-locally/non-switched service is not included. • Digital data services and ISDN BRA are not included. • DS1 extension capability is not included.
3.2 VF services	• VF service is not included.
3.3 Coin - Option	• Circuit related description is not included.
3.4 DDS capability	• DDS capability is not included.
3.5 Non -locally/non switched service	• Non-locally/non-switched service is not included.
3.6 Requirements for the ISDN capability	• ISDN capability is not included.
3.7 Service related requirements	• On hook transmission is only included and other specifications are deleted.
4.1 Physical interface	• SDH is included as optional specification. • ISDN capability is not included.
5 Operation system interface	• Operation system interface is not included.
6 IDLC system capabilities	• IDLC system capabilities are not included except concentration function.
7 Requirements supporting craftsperson interfacing to IDLC system	• Requirements supporting craftsperson are not included.

Table S-1/C-IF3.04 Differences from Bellcore GR-303-CORE(2/5)

8 Requirements supporting IDLC administration	•Requirements supporting IDLC administration are not included.
9 Requirements supporting system turn-up	•Requirements supporting system turn-up are not included.
10 Miscellaneous	•Miscellaneous are not included.
11 IDLC system transition considerations	•IDLC system transition considerations are not included.
12.1 Introduction	•FITL systems are not included.
12.2 Executive summary	•SDH is included as optional specification. •TMC and EOC are not included. •ISDN Basic Access is not included.
12.3 Application of the generic IDLC interface	•SDH method is added to the generic IDLC applications as option. •Hybrid signaling is not included.
12.3.1 Selecting the number of DS1s	•Non-switched service is not included.
12.3.2 Selecting the call processing signaling method	•Hybrid signaling is not included.
12.4.1 General	•IDLC system/terminal operations are not included. •Loop testing is included but TSC and RTU are not included. •Hybrid signaling is not included.
12.4.2.2 IDLC system/terminal operations	•IDLC system/terminal operations are not included.
12.4.2.3 Call processing	•ABCD robbed bit signaling is not included.
12.4.2.5 Loop testing	•Loop testing is included but TSC and remote measuring unit are not included.
12.4.2.6 summary	•EOC is not included.
12.4.3.5 LAPD requirements for IDLC system	•EOC is not included.
12.4.3.5.4 N201	•EOC is not included.
12.4.3.5.11 SAPI/TEI addressing conventions	•EOC logical data-link is not included.
12.4.3.6 Management entity requirements	•EOC is not included.
12.5.1.1 Hybrid signaling	•Hybrid signaling is not included.
12.5.2 Call processing Messages	•Hybrid signaling is not included.
12.5.2.1 ABCD cocds	•ABCD codes are not included.
12.5.2.2 TMC/ CSC messages	•Title is changed to CSC messages. In this section, TMC messages are not included.
12.5.2.2.1 SETUP	•Multi-party circuit is not included.
12.5.2.2.3 ALERTING	•This message does not indicate that it has notified to WCS/WSU to start alerting .

Table S-1/C-IF3.04 Differences from Bellcore GR-303-CORE(3/5)

12.5.2.2.4 CALL PROCEEDING	•This message may not indicate that it has notified to WCS/WSU to start terminating call proceeding.
12.5.2.2.5 CONNECT message	•ISDN Basic Access is not included.
12.5.2.2.9 INFORMATION	•Reminder ring is not included.
12.5.2.2.10 NOTIFY	•Multi-party functions are not included.
12.5.2.2.13 CONNECT ACKNOWLEDGE	•This message is not included.
12.5.2.3 TMC and CSC information elements	•Thi section title is changed to CSC information elements. •In this section, these information elements shall be changed according to the network. •In this section, TMC messages are not included.
12.5.2.3.2 Call reference	•RDT physical termination ports are not included. •FITL system is not included in this specification.
12.5.2.3.5 Cause	•Value 27 may be used by WAC to notice permanent signal. •OS is not included. •Value 35 may be used when radio channel not established.
12.5.2.3.8 Notification indicator	•Some information elements are deleted.
12.5.2.3.10 Signal	•Reminder ring, -T ringing, +R ringing and +T ringing of signal value are not included.
12.5.3 Time-slot management channel scenarios	•Time-slot management channel scenarios are not included.
12.5.4.1 General	•Loop/ ground start circuit are replaced to single party and loop reverse battery circuit is replaced to single party (Direct Dialling In). •In this section, Customer interface is replaced to customer side equipment interface. •In this section, TMC messages are not included. •Multi-party, ISDN Basic Access and DDS circuits are not included. •Transmission path requirements are not included.
12.5.4.2 Loop start circuits	•Section title is changed to Single party.
12.5.4.2.1 Establishment initiated by the IDT	•Ring pretrip test may be performed by WSU.
12.5.4.2.2 Establishment initiated by the CPE	•This title is changed to Establishment initiated by the TE.
12.5.4.2.3 Clearing initiated by the IDT	•The RELEASE message sent by the WAC may contain one of two cause values.(16/27)
12.5.4.3 Ground start circuits	•This section is consolidated to “12.5.4.2 Single party” section.
12.5.4.4 Loop reverse battery circuit	•Section title is changed to Single party (Direct Dialling In).

Table S-1/C-IF3.04 Differences from Bellcore GR-303-CORE(4/5)

12.5.4.4.1 Establishment	• CALL PROCEEDING message and NOTIFY message shall be sent autonomously.
12.5.4.6 Multi party - option	• Multi - party service is not included.
12.5.4.7 ISDN Basic Access Circuits - Option	• ISDN is not included.
12.5.4.8 DDS circuits - option	• DDS is not included .
12.5.5 Detailed TMC/CSC messages	• In this section, TMC is not included . • In this section, Customer interface is not included . • Connect request state is not included .
12.5.5.1.1 IDT(Null - 0)	• Counting registers are not included . • Reminder ring service is not included .
12.5.5.1.2 RDT(Null - 0)	• Reminder ring service is not included.
12.5.5.2.1 IDT(call initiated - 1)	• Counting registers are not included.
12.5.5.4.1 IDT(call present - 6)	• R12-324 applies to Single party. • R12-325 applies to Single party(DDI). • ISDN Basic Access is not included.
12.5.5.4.2 RDT(call present - 6)	• R12-329 applies to Single party. • R12-334 applies to Single party(DDI).
12.5.5.5.1 IDT(call received-7)	• NOTIFY message may be sent autonomously.
12.5.5.5.2 RDT(call received-7)	• NOTIFY message may be sent autonomously.
12.5.5.6.1 IDT(call proceeding -9)	• NOTIFY message may be sent autonomously.
12.5.5.6.2 RDT(call proceeding -9)	• NOTIFY message may be sent autonomously.
12.5.5.8.1 IDT(disconnect request - 11)	• Multi-party circuit is not included.
12.5.5.8.2 RDT(disconnect request - 11)	• Multi-party circuit is not included.
12.5.5.9.2 RDT(disconnect indication - 12)	• If customer is still off-hook but air channel has been disconnected, RELEASE message will be send from WAC to SN with cause value 27.
12.5.5.13 Tip party test-option	• Tip party test is not included.
12.5.5.17 TMC/CSC timers	• This title is changed to CSC timers.
12.5.5.17.2 T305	• At the IDT, the value of T305 may be extended according to air channel timer.
12.5.5.17.6 T398	• T398 is not included.
12.5.5.17.8 T313	• T313 is not included.
12.5.5.18 Connect request - 8	• Connect request is not included.

Table S-1/C-IF3.04 Differences from Bellcore GR-303-CORE(5/5)

12.5.5.19 Blocked Originating Call Procedures I	• This section is not included.
12.5.5.19 Blocked Originating Call Procedures II	• This section is not included.
12.5.6 Provisioning Scenarios	• Provisioning scenarios are not included.
12.5.7 ISDN Basic Access - option	• ISDN is not included.
12.5.8 Transmission - voice	• Transmission requirements are not included.
12.5.9 Signalling and supervision	• Signalling and supervision are not included.
12.5.10 Multi-IG Feature	• CRV may be designed by operator. • TMC and EOC is not included. • ISDN Line termination is not included.
12.6.1.2 Physical layer requirements	• Option “16” and robbed-bit signalling is not included. • ISDN related description is not included.
12.6.1.3 Data-link layer requirements	• ABCD robbed-bit signalling is not included. • Hybrid signalling is not included. • EOC is not included.
12.6.1.3.1 ABCD robbed-bit signalling	• ABCD robbed-bit signalling is not included.
12.6.1.3.2 Call processing DL control	• TMC and EOC is not included.
12.6.1.3.3 Operations DL control	• Operations DL control is not included.
12.6.1.4 Convergence function	• Convergence function is not included.
12.6.1.5 Application layer	• Application layer is not included.
12.6.3 EOC and TMC/CSC path protection switching	• EOC and TMC path protection switching is not included.
12.7 Operations requirements across the generic IDLC interface	• Operation requirements across the generic IDLC interface is not included .
12.8 Requirements and options supporting system turn-up	• Requirements and options supporting system turn-up is not include in this specification.
12.9 UDLC to IDLC transition considerations	• UDLC to IDLC transition considerations is not included.

WAC-Service Network Interface Specifications
-Bellcore GR-303-CORE Interface-
-Minimum Set Specification-

CONTENTS

*:This mark indicates sections which are specified in GR-303-CORE but are not included in this PHS-FWA MoU specification.

1. Introduction

1.1 Purpose

This section is specified in section 1.1 of GR-303-CORE. And these specifications include SDH transmission as the physical layer.

1.2 Scope and Assumptions

This section is specified in section 1.2 of GR-303-CORE.

1.3 A Summary of System and Generic IDLC Interface Requirements

1.3.1 End-to-End System Requirements Summary

An IDLC system must be able to interface to other digital transmission systems in CO. This specification includes requirements and options on signal frame formats, signalling, performance.

1.3.2 Generic IDLC Interface Requirements Summary

This section is specified in section 1.3.2 of GR-303-CORE. And SDH transmission is another option for physical layer. Operation related specifications are not specified in PHS-FWA documents. Also A 16-state robbed-bit signalling is not specified in PHS-FWA documents. ISDN also is not included.

1.3.3 Miscellaneous Items *

1.4 Key to Bellcore documents related to this GR *

1.5 Applications of IDLC systems *

1.6 Differences from TR-NWT-000303, Issue 2 *

1.7 Organization of document

This section is specified in section 1.3.2 of GR-303-CORE. But section 7-11 and appendix A are deleted.

1.8 Requirements terminology

This section is specified in section 1.8 of GR-303-CORE.

1.9 Requirement labeling conventions

This section is specified in section 1.9 of GR-303-CORE.

2. Definition of Terms

2.1 Network Architecture and Definitions.

Figure 2-1 of GR-303-CORE illustrates a generic IDLC system network architecture for IDLC system and Operation interface and Line Termination Equipment are deleted.

2.1.1 FWA Access Controller (WAC)

The WAC is an intelligent network element that interfaces between FWA Cell Station (WCS) and DS1 rate facilities. Functional block diagram of WAC is operator dependent. The RDT may be functionally divided into three parts : WCS interface functions, common system functions, and Digital Transmission Facility (DTF) Interface functions. Common system functions include signalling insertion and extraction, multiplexing and demultiplexing, concentration, time-slot interchange, channel tests, and frame alignment.

In addition, transmission facility interface functions as described in the next section may be included in the WAC.

WCS functions are not specified and WCS is described as “customer side equipment” in this document.

2.1.2 Digital Transmission Facility (DTF) Interface

This section is specified in section 2.1.2 of GR-303-CORE.

2.1.3 Integrated Digital Terminal (IDT)

This section is specified in section 2.1.3 of GR-303-CORE.

2.1.4 Integrated Network Access *

3 Requirements and Options for Customer Services

3.1 Summary of Required and Optional Service Capabilities

This section is specified in section 2.1.3 of GR-303-CORE.

Although circuit type (e.g. loop-start, ground-start and loop-reverse-battery) are described in GR-303-CORE, this document does not include circuit type because circuit type should be defined in FWA Subscriber Unit (WSU) in PHS-FWA document. “Single party” is used to represent loop-start, ground start circuit, and, “Single party (Direct Dialling In)” is used to represent loop-reverse-battery circuit.

Non-locally/non-switched service, Digital Data service, DS1 extension capability and ISDN BRA capability which are specified as option are not supported in PHS-FWA system.

That single party service category, for example emergency call, calling number delivery, are described in C-SV0.00/1.00 of PHS-FWA document.

3.2 VF Services *

3.3 Coin - option

This section is specified in section 3.3 of GR-303-CORE.

Circuit type shall not be described in this specification.

This documents describe coin telephone function according to Bellcore standard. But these coin telephone functions are one example and these functions shall be changed according to national standard.

3.4 Digital Data System (DDS) Capability - option *

3.5 Non-locally/Non-switched Services - option *

3.6 Requirements for the ISDN Capability - option *

3.7 Service Related Requirements *

3.7.1 Digital Bridging *

3.7.2 Universal Channel Units - Options *

3.7.3 On-hook Transmission Capability

This section is specified in section 3.7.3 of GR-303-CORE.

3.7.4 Requirements for DS1 Extensions - Option *

4. Requirements Supporting Interfacing to the Digital Network

This section is specified in section 4 of GR-303-CORE.

These specifications are described according to DS1 rate physical interface. As optional transmission capability SDH transmission capability is added to this specification. Signal is transported according to STM-1(Synchronous Transport Module -1) and interface speed is 155.52Mb/s. Detail specifications are standardized in ITU-T.

In section 4.4.10, “ISDN capability” is not required.

5. Operation System Interfaces *

6. IDLC System Capabilities : Requirements and Options

6.1 System Requirements *

6.2 System Options *

6.2.1 Facility Protection Switching - Option *

6.2.2 Concentration

This section is specified in section 6.2.2 of GR-303-CORE.

6.2.3 Remote Test Unit *

6.2.4 Automatic Line Insulation Tests (ALITs) *

6.2.5 Software Downloading - Options *

7. Requirements Supporting Craftperson Interfacing to IDLC systems *

8. Requirements Supporting IDLC Administration *

9. Requirements Supporting System Turn-Up *

10. Miscellaneous *

11. IDLC System Transition Considerations *

12. LDS-RDT Generic Interface - Requirements and Options

12.1 Introduction

This section is specified in section 12.1 of GR-303-CORE and FITL system is deleted.

12.2 Generic IDLC Interface Requirements - Executive Summary

This section is specified in section 12.2 of GR-303-CORE.

The physical layer of this specification have SDH transmission capability as optional function.

Hybrid signaling which is one of call proceeding technique is not used, and Common Signaling Channel (CSC) is used for making time-slot assignments and for call supervision.

Embedded Operation Channel (EOC) is not included.

ISDN Basic Access is not included.

12.3 Applications of the Generic IDLC Interface

This section is specified in section 12.3 of GR-303-CORE.

When DS1 is used as physical layer, the Selecting number of DS1 is more simplified because of not supporting of non-switched service.

“12.3.2 Selecting the Call Processing Method” is deleted because hybrid signaling is not supported in

PHS-FWA.

12.4 Interface Functionality

12.4.1 General

This section is specified in section 12.4.1 of GR-303-CORE.

Loop testing function is not included.

In call processing only out-of-band signaling is supported.

12.4.2 Generic Implementation of Interface Function

12.4.2.1 DS1 Facility Operations

This section is specified in section 12.4.2.1 of GR-303-CORE.

12.4.2.2 IDLC System/Terminal Operations *

12.4.2.3 Call Processing

This section is specified in section 12.4.2.3 of GR-303-CORE.

Call processing is accommodated by only out-of-band signaling and used for all signaling and dynamic time-slot management needs. The use of the CSC allows all DS0s to be transported as clear-channel DS0s between the WAC and SN.

The SN and WAC shall support out-of-band signaling using the CSC.

12.4.2.4 Information Transport

This section is specified in section 12.4.2.4 of GR-303-CORE.

12.4.2.5 Loop Testing *

12.4.2.6 Summary

This section is specified in section 12.4.2.6 of GR-303-CORE leaving out operation data link (EOC).

12.4.3 LAPD protocol

This section is specified in section 12.4.3 of GR-303-CORE leaving out operation data link (EOC).

When LAPD protocol data link is established SAPI/TEI is mapped for CSC logical data-link and EOC logical data-link. Following SAPI/TEI combinations are deleted from this specification.

a. SAPI=1 and TEI=0 of the EOC is not included.
b.SAPI=1 and TEI=4 of the EOC is not included.

c.SAPI=1 and TEI=1 of the EOC is not included.
d.SAPI=1 and TEI=2 of the EOC is not included.
e.SAPI=1 and TEI=3 of the EOC is not included.
f.SAPI=1 and TEI=5 of the EOC is not included.

12.5 Requirements and Options Supporting Customer Services

12.5.1 Call Processing Techniques

12.5.1.1 Hybrid Signaling *

12.5.1.2 Out-of-Band Signaling

This section is specified in section 12.5.1.2 of GR-303-CORE.

12.5.2 Call Processing Messages

This section is specified in section 12.5.2 of GR-303-CORE leaving out ABCD codes needed for hybrid signaling.

12.5.2.1 ABCD codes *

12.5.2.2 CSC messages

This section is specified in section 12.5.2.2 of GR-303-CORE. Because TMC messages are not used, CONNECT ACKNOWLEDGE is not included in this specification.

12.5.2.2.1 SETUP messages

This section is specified in section 12.5.2.2.1 of GR-303-CORE leaving out TMC related requirements.
Multi-party circuits specifications are not included.

12.5.2.2.2 SETUP ACKNOWLEDGE Message

This section is specified in section 12.5.2.2.2 of GR-303-CORE leaving out TMC related requirements.

12.5.2.2.3 ALERTING message

This section is specified in section 12.5.2.2.3 of GR-303-CORE leaving out TMC related requirements.
WAC may not notify to IDT that connection between WAC and WCS/WSU has been established and began alerting.

12.5.2.2.4 CALL PROCEEDING message

This section is specified in section 12.5.2.2.4 of GR-303-CORE leaving out TMC related

requirements.
WAC may not notify to IDT that connection between WAC and WCS/WSU has been established and began call proceeding.

12.5.2.2.5 CONNECT message

This section is specified in section 12.5.2.2.5 of GR-303-CORE leaving out TMC related requirements.

ISDN Basic Access is not included.

12.5.2.2.6 DISCONNECT message

This section is specified in section 12.5.2.2.6 of GR-303-CORE leaving out TMC related requirements.

12.5.2.2.7 RELEASE message

This section is specified in section 12.5.2.2.7 of GR-303-CORE leaving out TMC related requirements.

The WAC sends a RELEASE message in response to a DISCONNECT message to signal that the connection between WAC and customer has been released successfully. The WAC also sends a RELEASE message in response to DISCONNECT message to signal that the customer has entered permanent signal state because of long unavailable off-hook.

12.5.2.2.8 RELEASE COMPLETE message

This section is specified in section 12.5.2.2.8 of GR-303-CORE leaving out TMC related requirements.

12.5.2.2.9 INFORMATION message

This section is specified in section 12.5.2.2.9 of GR-303-CORE leaving out TMC related requirements.
Reminder ring is not included in CR12-143.

12.5.2.2.10 NOTIFY message

This section is specified in section 12.5.2.2.10 of GR-303-CORE leaving out TMC related requirements.
Multi party service is not included.
“Loop/ground start circuit” is replaced to “single party” and “loop reverse battery circuit” is replaced to “single party (Direct Dialling In)”.

12.5.2.2.11 STATUS ENQUIRY message

This section is specified in section 12.5.2.2.11 of GR-303-CORE leaving out TMC related requirements.

12.5.2.2.12 STATUS message

This section is specified in section 12.5.2.2.12 of GR-303-CORE leaving out TMC related requirements.

12.5.2.2.13 CONNECT ACKNOWLEDGE message *

12.5.2.3 CSC Information Elements

This section is specified in section 12.5.2.3 of GR-303-CORE.

These information elements and element encode patterns are one example and these shall be changed according to national standard.

12.5.2.3.1 Protocol Discriminator

This section is specified in section 12.5.2.3.1 of GR-303-CORE leaving out TMC related requirements.

12.5.2.3.2 Call Reference

This section is specified in section 12.5.2.3.2 of GR-303-CORE leaving out TMC related requirements and FITL system related requirements.

In R12-155, Call Reference Value is used as customer side equipment logical number in PHS-FWA system and WAC may support a provisionable association between customer side equipment logical number and CRVs at the WAC.

In R12-156, figure of call reference value may be modified by national operator.

12.5.2.3.3 Message Type

This section is specified in section 12.5.2.3.3 of GR-303-CORE leaving out TMC related requirements.

12.5.2.3.4 Bearer Capability

This section is specified in section 12.5.2.3.4 of GR-303-CORE leaving out TMC related requirements.

12.5.2.3.5 Cause

This section is specified in section 12.5.2.3.5 of GR-303-CORE leaving out TMC related requirements.

Cause 27 is replaced as follows.
The WAC may use this cause value in RELEASE message to indicate that call clearing which is response to DISCONNECT message from IDT was failed because of long unavailable off-hook after the communication finished. In this case, the customer has entered permanent signal state. After receiving a message with this cause value, the WAC shall clear the time slot and continue to monitor the line. The WAC will report the return to on-hook status in an INFORMATION message as described in section 12.5.5. IDT may use this cause value in some cases.

In cause 34 OS is not included.

Cause 35 may also used to indicate that no available air channels between WCS and WSU exists for call establishment.

12.5.2.3.6 Call State

This section is specified in section 12.5.2.3.6 of GR-303-CORE leaving out TMC related requirements.

12.5.2.3.7 Channel Identification

This section is specified in section 12.5.2.3.7 of GR-303-CORE leaving out TMC related requirements.
If SDH transmission is used between WAC and SN, Channel identification may be different from this specification.

12.5.2.3.8 Notification Indicator

This section is specified in section 12.5.2.3.8 of GR-303-CORE leaving out TMC related requirements. In table 12-9 connect / disconnect dial pulse detector, tip party test / ground and no tip party ground is not included.

12.5.2.3.9 Keypad Facility

This section is specified in section 12.5.2.3.9 of GR-303-CORE leaving out TMC related requirements.

12.5.2.3.10 Signal

The Signal element shall be formatted as 12.5.2.3.10 of GR-303-CORE.

The IDT uses the signal element to specify an alerting pattern for the WSU to apply to customer.

The IDT shall encode signal value based on Table 12-11 bis. instead of table 12-11 of GR-303-CORE.

Table 12-11 bis. : Signal Value Coding

Signal Value	Coding 8 7 6 5 4 3 2 1	Reference
-R Ringing	0 1 0 0 0 0 0 0	TR-NWT-000057
Pattern A	0 1 0 0 0 0 1 0	TR-NWT-000057
Pattern B	0 1 0 0 0 0 1 1	TR-NWT-000057
Pattern C	0 1 0 0 0 1 0 0	TR-NWT-000057
Pattern D	0 1 0 0 0 1 0 1	TR-NWT-000057
Pattern E	0 1 0 0 0 1 1 0	TR-NWT-000057
Pattern F	0 1 0 0 0 1 1 1	TR-NWT-000057
Pattern G	0 1 0 0 1 0 1 1	TR-NWT-000057
Alerting Off	0 1 0 0 1 1 1 1	No Reference

12.5.2.3.11 Switchhook

This section is specified in section 12.5.2.3.11 of GR-303-CORE leaving out TMC related requirements.

12.5.3 Time-Slot Management Channel Scenarios *

12.5.4 Common Signalling Channel Scenarios

12.5.4.1 General

This section is specified in section 12.5.4.1 of GR-303-CORE.

The performance monitoring in R12-195 and transmission path requirements in R12-196 are not included.

Title “Loop/ground start circuit” is replaced to “single party” and “loop reverse battery circuit” is replaced to “single party (Direct Dialling In)”.

ISDN Basic Access, DDS circuits and multiparty are not supported.

12.5.4.2 Single party

12.5.4.2.1 Established Initiated by the IDT

This section is specified in section 12.5.4.2.1 of GR-303-CORE.

Ring pretrip test is performed in WSU and is not included.

R12-199 is replaced as follows.
Once the WAC determines that it can complete the call, it shall notice to customer side equipment that terminating call has accepted, and it shall send an ALERTING message.

R12-201 is replaced as follows.
If the cusotmer subscribes to calling number delivery, the SN will forward the calling number to WAC with on hook transmission and WAC will forward it to customer side equipment.

R12-202 is replaced as follows.
When WAC was noticed from customer side equipment that customer has turned off hook, it shall send a CONNECT message to SN.

12.5.4.2.2 Established Initiated by the TE

This section is specified in section 12.5.4.2.2 of GR-303-CORE

R12-203 is replaced as follows.
When the WAC receives signal of detecting off-hook of TE, it shall send a SETUP message to tell the IDT that a customer is requesting service.

R12-206 is replaced as follows.
When WAC receives addressing information from customer side equipment, the WAC shall forward to IDT, digit by digit in INFORMATION message or Dual Tone Multifrequency (DTMF) signals.

O12-208 is replaced as follows.
The SN may request, via a NOTIFY message, that call is a toll call.

12.5.4.2.3 Clearing Initiated by the IDT

This section is specified in section 12.5.4.2.3 of GR-303-CORE.

R12-210 is replaced as follows.
In response, the WAC shall forward disconnect toward the customer side equipment.

R12-211 is replaced as follows.
When the WAC received signal indicating on hook of customer from the customer side equipment, it shall disconnect the line unit from the DS0 and send RELEASE message.

In R12-213, the RELEASE message sent by WAC also shall contain one of two cause values

12.5.4.2.4 Clearing Initiated by the TE

R12-214 is replaced as follows.
When the WAC received signal indicating on hook of customer from the customer side equipment, it shall send a DISCONNECT message to IDT.

In R12-218, circuit related description shall be deleted (e.g. the hit - protection/ flash/ disconnect timing requirements shall be deleted) .

R12-219 depends on national protocol.

12.5.4.3 Ground Start Circuits *

12.5.4.4 Single Party (Direct Dialling In)

Three control protocol is not included (wink start/ immediate dial/ delay dial).

12.5.4.4.1 Establishment

This section is specified in 12.5.4.4.1 of GR-303-CORE.

R12-247 is replaced as follows.
Once the WAC determines that it can complete the call, it shall send CALL PROCEEDING message to IDT autonomously.

R12-248 is replaced as follows.
After R12-247, the WAC shall transmit NOTIFY message autonomously.

R12-249 and R12-250 are replaced as follows.
The IDT shall send all digits to WAC in a single INFORMATION message, or with DTMF or Multifrequency (MF) signaling, and WAC will forward the destination number to customer side equipment.

R12-251 is replaced as follows.
When the WAC receives signal that indicate an off-hook signal from customer side equipment, it shall send a CONNECT message.

12.5.4.4.2 Clearing Initiated by the IDT

This section is specified in section 12.5.4.2.3.

12.5.4.4.3 Clearing Initiated by the WAC

This section is specified in section 12.5.4.2.4.

12.5.4.4.4 Clearing Initiated by the TE during a Basic E-911 Call

This section is specified in section 12.5.4.4.4 of GR-303-CORE.

R12-261 is replaced as follows.
When the WAC receives signal indicating on hook of customer from customer side equipment, it shall send a DISCONNECT message to IDT.

R12-263 is replaced as follows.
When the WAC receives signal indicating off hook of customer from customer side equipment, it shall send a INFORMATION message to IDT.

12.5.4.4.5 Clearing Initiated by the TE during an Expanded E-911 call - Option

This section is specified in section 12.5.4.4.5 of GR-303-CORE.

R12-265 is replaced as follows.
When the WAC receives signal indicating on hook of customer from customer side equipment, it shall send a DISCONNECT message to IDT.

In R12-267, the IDT can send an INFORMATION message to the WAC to notice ringback to customer side equipment.

In R12-269, WAC will notice to stop ringback or resend ringback to customer side equipment.

R12-271 is replaced as follows.
When the WAC detects the customer turn off-hook from customer side equipment, the WAC shall send a CONNECT message to the IDT to re-establish the call.

12.5.4.5 Coin - Option

This section describe one example of coin service (or pay phone service) according to Bellcore documents. The IDT and WAC exchange NOTIFY message over CSC to perform coin specific functions. See section 12.5.5 for further details.

12.5.4.6 Multi-Party - Option *

12.5.4.7 ISDN Basic Access Circuits - Option *

12.5.4.8 Digital Data System (DDS) Circuits - Option *

12.5.4.9 On-Hook Transmission

This section is specified in section 12.5.4.9 of GR-303-CORE.

12.5.5 Detailed CSC Procedures

This section is specified in section 12.5.5 of GR-303-CORE leaving out TMC related requirements. Because TMC messages are not used, Connect Request state is not included in this specification.

12.5.1.1 Null - 0

12.5.5.1.1 IDT (Null - 0)

This section is specified in section 12.5.5.1.1 of GR-303-CORE leaving out TMC descriptions.

In R12-289, counting register shall be deleted.

R12-291 shall be deleted.

12.5.5.1.2 WAC (Null - 0)

This section is specified in section 12.5.5.1.2 of GR-303-CORE leaving out TMC descriptions.

In R12-293, detecting seizure signal or off-hook of line is not used and signal that indicate that customer has off-hook is received from customer side equipment.

In R12-296 shall be deleted.

12.5.5.2 Call Initiated - 1

12.5.5.2.1 IDT (Call Initiated - 1)

This section is specified in section 12.5.5.2.1 of GR-303-CORE leaving out TMC descriptions.

R12-297 shall be deleted.

In R12-299, counting register shall be deleted.

R12-300 shall be deleted.

12.5.5.2.2 WAC (Call Initiated - 1)

This section is specified in section 12.5.5.2.2 of GR-303-CORE leaving out TMC descriptions.

In R12-303, “notify the WAC’s Call Control entity to connect the line unit to the specified DS0” is replaced to “notify the WAC’s Call Control entity to connect the customer side equipment to specified DS0”.

R12-304 shall be deleted.

R12-306 shall be deleted.

O12-307 shall be deleted.

12.5.5.3 Overlap Sending - 2

12.5.5.3.1 IDT (Overlap Sending - 2)

This section is specified in section 12.5.5.3.1 of GR-303-CORE leaving out TMC descriptions.

12.5.5.3.2 WAC (Overlap Sending - 2)

This section is specified in section 12.5.5.3.2 of GR-303-CORE leaving out TMC descriptions.

In R12-314, WAC does not detect dial pulse digit from customer but receives addressing dial from customer side equipment during the establishment phase of an originating call.

12.5.5.4 Call Present - 6

12.5.5.4.1 IDT (Call Present - 6)

This section is specified in section 12.5.5.4.1 of GR-303-CORE leaving out TMC descriptions.

In R12-317, ISDN Basic Access service is not included.

In R12-324, ALERTING message may notice to IDT that WAC has accepted a call, but may not notice that free air channel is kept and customer has been alerting. This section is applied to single party.

In R12-325, CALL PROCEEDING message may notice to IDT that WAC has accepted a call, but may not notice that free air channel is kept and customer has been alerting. This section is applied to single party (Direct Dialling In).

12.5.5.4.2 WAC (Call Present - 6)

This section is specified in section 12.5.5.4.2 of GR-303-CORE leaving out TMC descriptions.

R12-327 shall be applied when ISDN Basic Access service has been set up. “line unit” has replaced to “customer side equipment”.

R12-328 may be applied in cause 34 (Channel Unavailable). Cause 44(Line unit unavailable) and cause 47(Ring Failure) may not be applied in this case because these cause value was bring out at customer side equipment after the ALERTING message.

In R12-329, ALERTING message may be sent when WAC has accepted a terminating call and connected customer side equipment to proper DS0. This section is applied to single party.

In R12-334, CALL PROCEEDING message may be sent when WAC has accepted a terminating call with Direct Dialling In service and connected customer side equipment to proper DS0. This section is applied to single party (Direct Dialling In).

In R12-335, removing any alerting signal shall not be applied to the line.

12.5.5.5 Call Received - 7

12.5.5.5.1 IDT (Call Received - 7)

This section is specified in section 12.5.5.5.1 of GR-303-CORE leaving out TMC descriptions.

In R12-336, NOTIFY message may be sent by WAC autonomously because alerting cadence is not controlled in WAC. After receiving NOTIFY message, calling number delivery service will be carried out with forwarding received calling number from SN to WAC if customer subscribes to calling number delivery.

12.5.5.5.2 WAC (Call Received - 7)

This section is specified in section 12.5.5.5.2 of GR-303-CORE leaving out TMC descriptions.

In R12-341, NOTIFY message may be sent by WAC autonomously because alerting cadence is not controlled in WAC. After sending NOTIFY message, calling number shall be received from IDT and WAC shall forward it to customer side equipment if customer subscribes to calling number delivery.

In R12-342, detection that the customer has answered is performed by WSU and customer side equipment shall forward to WAC.

12.5.5.6 Call Proceeding - 9

12.5.5.6.1 IDT (Call Proceeding - 9)

This section is specified in section 12.5.5.6.1 of GR-303-CORE leaving out TMC descriptions.

In R12-345, NOTIFY message may be sent by WAC autonomously because start dial signal is not controlled in WAC in single party (Direct Dialling In).

In R12-346, R12-347 and R12-348, loop reverse battery circuit is replaced to single party (Direct Dialling In).

12.5.5.6.2 WAC (Call Proceeding - 9)

This section is specified in section 12.5.5.6.2 of GR-303-CORE leaving out TMC descriptions.

In R12-349, Notify message may be sent by WAC autonomously because start dial signal is not controlled in WAC in single party (Direct Dialling In).

In R12-350, loop reverse battery circuit is replaced to single party (Direct Dialling In). After received the destination number, WAC shall forward it to customer side equipment.

In R12-351, loop reverse battery circuit is replaced to single party (Direct Dialling In).

12.5.5.7 Active -10

12.5.5.7.1 IDT (Active -10)

This section is specified in section 12.5.5.7.1 of GR-303-CORE leaving out TMC descriptions.

In R12-352, detection of swichhook flash or a dial pulse digit is accomplished by WSU and WAC will forward to IDT with INFORMATION message.

12.5.5.7.2 WAC (Active - 10)

This section is specified in section 12.5.5.7.2 of GR-303-CORE leaving out TMC descriptions.

In R12-354, detection of swichhook flash or a dial pulse digit is accomplished by WSU and WAC will forward to IDT with INFORMATION message.

R12-356, R12-357 and R12-358 shall be deleted.

12.5.5.8 Disconnect Request - 11

12.5.5.8.1 IDT (Disconnect Request - 11)

This section is specified in section 12.5.5.8.1 of GR-303-CORE leaving out TMC descriptions.

R12-360 shall be deleted.

12.5.5.8.2 WAC (Disconnect Request - 11)

This section is specified in section 12.5.5.8.2 of GR-303-CORE leaving out TMC descriptions.

R12-367 shall be deleted.

12.5.5.9 Disconnect Indication -12

12.5.5.9.1 IDT (Disconnect Indication - 12)

This section is specified in section 12.5.5.9.1 of GR-303-CORE leaving out TMC descriptions.

12.5.5.9.2 WAC (Disconnect Indication -12)

This section is specified in section 12.5.5.9.2 of GR-303-CORE leaving out TMC descriptions.

In addition, when customer entered to permanent signal state because of invalid long off hook, same RELEASE message shall be applied but cause value of this message may be changed to cause 27 (destination out of service). In this case the cause value in the message may not match that in the DISCONNECT message.

12.5.5.10 Release Request - 19

12.5.5.10.1 IDT (Release Request - 19)

This section is specified in section 12.5.5.10.1 of GR-303-CORE leaving out TMC descriptions.

12.5.5.10.2 WAC (Release Request - 19)

This section is specified in section 12.5.5.10.2 of GR-303-CORE leaving out TMC descriptions.

12.5.5.11 Call Clearing

12.5.5.11.1 IDT (Call Clearing)

This section is specified in section 12.5.5.11.1 of GR-303-CORE leaving out TMC descriptions.

In R12-380, detection of the customer’s on-hook is accomplished by WSU and it will be sent by customer side equipment to WAC.

R12-383 shall be deleted.

12.5.5.11.2 WAC (Call Clearing)

This section is specified in section 12.5.5.11.2 of GR-303-CORE leaving out TMC descriptions.

In R12-385 on receipt of the message, the WAC shall send disconnect signal to customer side equipment.

R12-386 shows how the WAC reacts when it revives customer’s off hook signal from customer side equipment.

R12-387 shall be deleted.

12.5.5.12 Coin - Option

This section describes coin telephone function according to Bellcore standard. But these coin telephone functions are one example and these shall be changed according to national standard.

Bellcore standard is specified in section 12.5.5.12 of GR-303-CORE.

12.5.5.13 Tip Party Test - Option *

12.5.5.14 Permanent Signal Procedures

This section is specified in section 12.5.5.11.2 of GR-303-CORE leaving out TMC descriptions.

In 12-398, the WAC may use cause value 27 in a RELEASE message.

12.5.5.14.1 IDT (Permanent Signal - 100)

This section is specified in section 12.5.5.14.1 of GR-303-CORE leaving out TMC descriptions.

12.5.5.14.2 WAC (Permanent Signal - 100)

This section is specified in section 12.5.5.14.2 of GR-303-CORE leaving out TMC descriptions.

In R12-403, detection of line in permanent signal to be on-hook is accomplished by WSU and it will be sent from customer side equipment to WAC.

O12-404 shall be deleted.

12.5.5.15 Call State Mismatch Procedures

This section is specified in section 12.5.5.15 of GR-303-CORE leaving out TMC descriptions.

12.5.5.16 Error Handling Procedures

This section is specified in section 12.5.5.16 of GR-303-CORE leaving out TMC descriptions.

12.5.5.17 CSC Timers

12.5.5.17.1 T303

This section is specified in section 12.5.5.17.1 of GR-303-CORE leaving out TMC descriptions.

12.5.5.17.2 T305

This section is specified in section 12.5.5.17.2 of GR-303-CORE leaving out TMC descriptions.

R12-447 shall be deleted.

In R12-448, the value of T305 at the IDT may need adaptation according to air interface timer.

12.5.5.17.3 T308

This section is specified in section 12.5.5.17.3 of GR-303-CORE leaving out TMC descriptions.

12.5.5.17.4 T322

This section is specified in section 12.5.5.17.4 of GR-303-CORE leaving out TMC descriptions.

12.5.5.17.5 T397

This section is specified in section 12.5.5.17.5 of GR-303-CORE leaving out TMC descriptions.

12.5.5.17.6 T398 *

12.5.5.17.7 T399

This section is specified in section 12.5.5.17.7 of GR-303-CORE leaving out TMC descriptions and this is one example of pay phone service.

12.5.5.17.8 T313 *

12.5.5.17.9 T396

This section is specified in section 12.5.5.17.9 of GR-303-CORE leaving out TMC descriptions.

12.5.5.17.10 T395

This section is specified in section 12.5.5.17.10 of GR-303-CORE leaving out TMC descriptions.

12.5.5.18 Connect Request - 8 *

12.5.5.19 Blocked Originating Call Procedures I *

12.5.5.20 Blocked Originating Call Procedures II *

12.5.6 Provisioning Scenarios *

12.5.7 ISDN Basic Access - Option *

12.5.8 Transmission - Voice *

12.5.9 Signaling and Supervision *

12.5.10 Multiple Interface Group (Multi - IG) Feature

12.5.10.1 Multi - IG Feature Description

This section is specified in section 12.5.10.1 of GR-303-CORE.

Call Reference Value is used as customer side equipment logical number and WAC may support a provisionable association between customer side equipment logical number and CRVs at the WAC. In other words, Call Reference Value is used as WCS's physical number. Association between CRV and customer physical number is provisioned according to national operator.

TMC, EOC and ISDN Line Termination are not included.

12.5.10.2 Multi -IG Benefits

This section is specified in section 12.5.10.2 of GR-303-CORE leaving out EOC and TMC description.

ISDN Line Termination is not included.

12.5.10.3 Requirements on an WAC for Multi -IG Feature

This section is specified in section 12.5.10.3 of GR-303-CORE leaving out EOC and TMC description.

12.6 Requirements and Options Supporting Interfacing to the Digital Network

12.6.1 Interface Requirements

This section is specified in section 12.6.1 of GR-303-CORE.

12.6.1.1 Additional DTF- Interfaces Requirements

This section is specified in section 12.6.1.1 of GR-303-CORE.

12.6.1.2 Physical Layer Requirements

This section is specified in section 12.6.1.2 of GR-303-CORE.

Robbed- bit- signaling and option “16” is not included.

ISDN related description is not included.

12.6.1.3 Data - Link Layer Requirements

This section is specified in section 12.6.1.3 of GR-303-CORE.

ABCD robbed - bit signaling and hybrid signaling is not included.

12.6.1.3.1 ABCD Robbed - Bit Signaling *

12.6.1.3.2 Call Processing (TMC/CSC) DL control

This section is included in section 12.6.1.3.2 of GR-303-CORE.

TMC data link is not included.

12.6.1.3.3 Operations DL control *

12.6.1.3.4 Convergence Function *

12.6.1.3.5 Application Layer *

12.6.2 DS1 Facility Protection Switch -Option

This section is included in section 12.6.2 of GR-303-CORE.

12.6.3 EOC and TMC/CSC Path Protection Switching

This section is included in section 12.6.3 of GR-303-CORE.

EOC and TMC path protection switching is not included.

12.7 Operations Requirements Across the Generic IDLC Interface *

12.8 Requirements and Options Supporting System Turn-up *

12.9 UDLC to IDLC Transition Considerations *

13. Feature Set C - SONET Interface

This section is specified in section 13 of GR-303-CORE.

Annex A

Examples of PSTN sequence on GR-303-CORE interface

(1) Originating call (successful call setup)
(note) This sequence includes Ground Start PBX call setup.
refer to Figure A.1/C-IF3.04

(2) Originating call (originating party disconnection)
refer to Figure A.2/C-IF3.04

(3) Originating call (terminating party disconnection)
refer to Figure A.3/C-IF3.04

(4) Originating call (not accepted by switch)
refer to Figure A.4/C-IF3.04

(5) Originating call (customer abandoned the call)
refer to Figure A.5/C-IF3.04

(6) Originating call (WAC rejected the call)
refer to Figure A.6/C-IF3.04

(7) Terminating call (successful call setup)
refer to Figure A.7/C-IF3.04

(8) Terminating call (originating party disconnection)
refer to Figure A.2/C-IF3.04

(9) Terminating call (terminating party disconnection)
refer to Figure A.3/C-IF3.04

(10) Terminating call (originating party abandoned the call)
refer to Figure A.8/C-IF3.04

(11) Terminating call (WAC rejected the call)
refer to Figure A.9/C-IF3.04

(12) Terminating call with Direct Dialling In (successful call setup)
refer to Figure A.10/C-IF3.04

(13) Terminating call with Direct Dialling In (originating party abandoned the call)
refer to Figure A.8/C-IF3.04

(14) Terminating call with Calling Line Identification Presentation (success call setup)
refer to Figure A.11/C-IF3.04

(15) Permanent signal state (customer is invalid off-hook)
refer to Figure A.12/C-IF3.04

(16) Semi- normal sequence (Call Collision)
refer to Figure A.13/C-IF3.04

(17) Special Feature (Hooking Signal transmission)
refer to Figure A.14/C-IF3.04

(18) Originating Call (pay phone service)
refer to Figure A.15/C-IF3.04

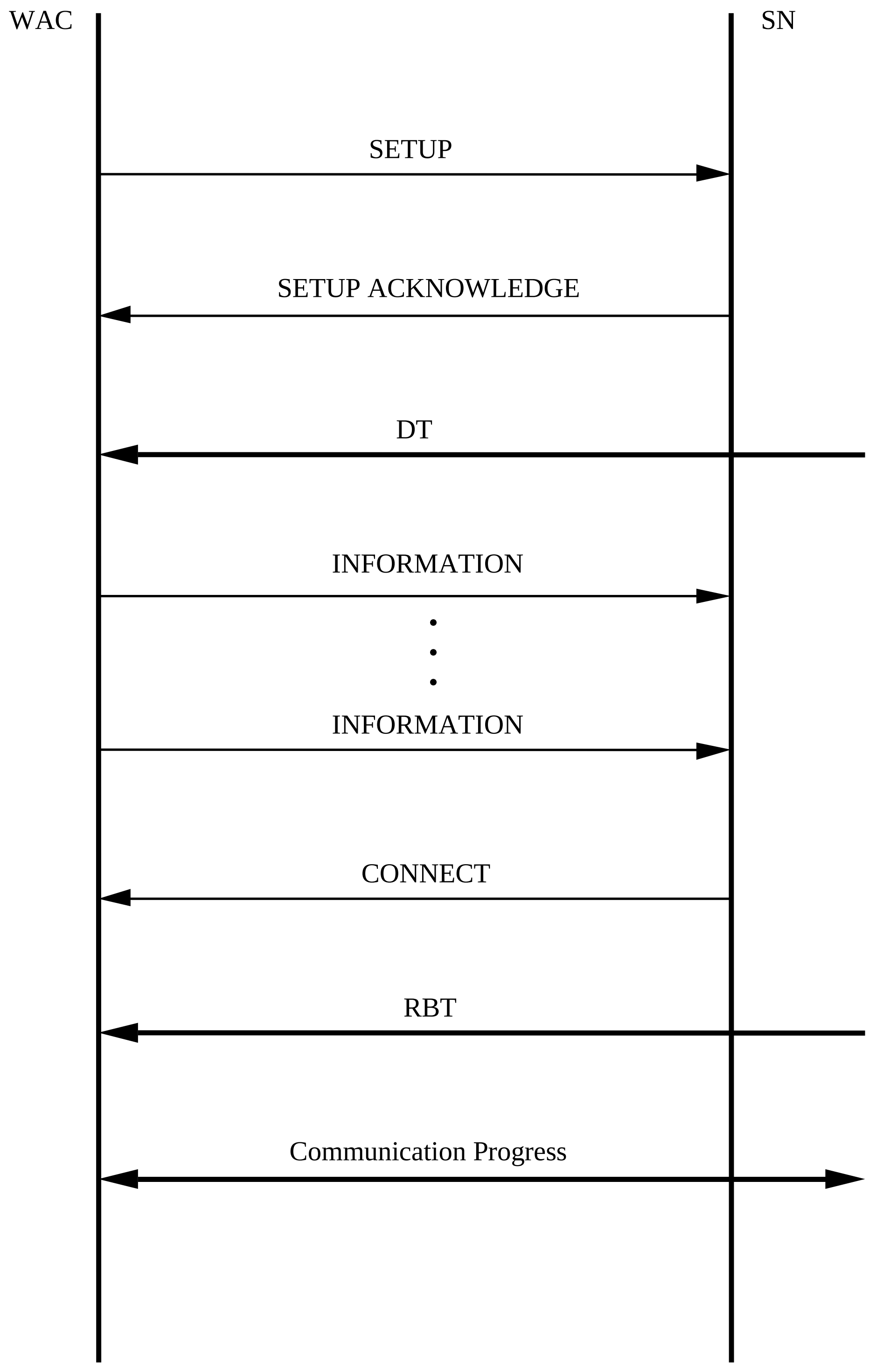

Figure A.1/C-IF3.04 Originating Call (successful call setup)

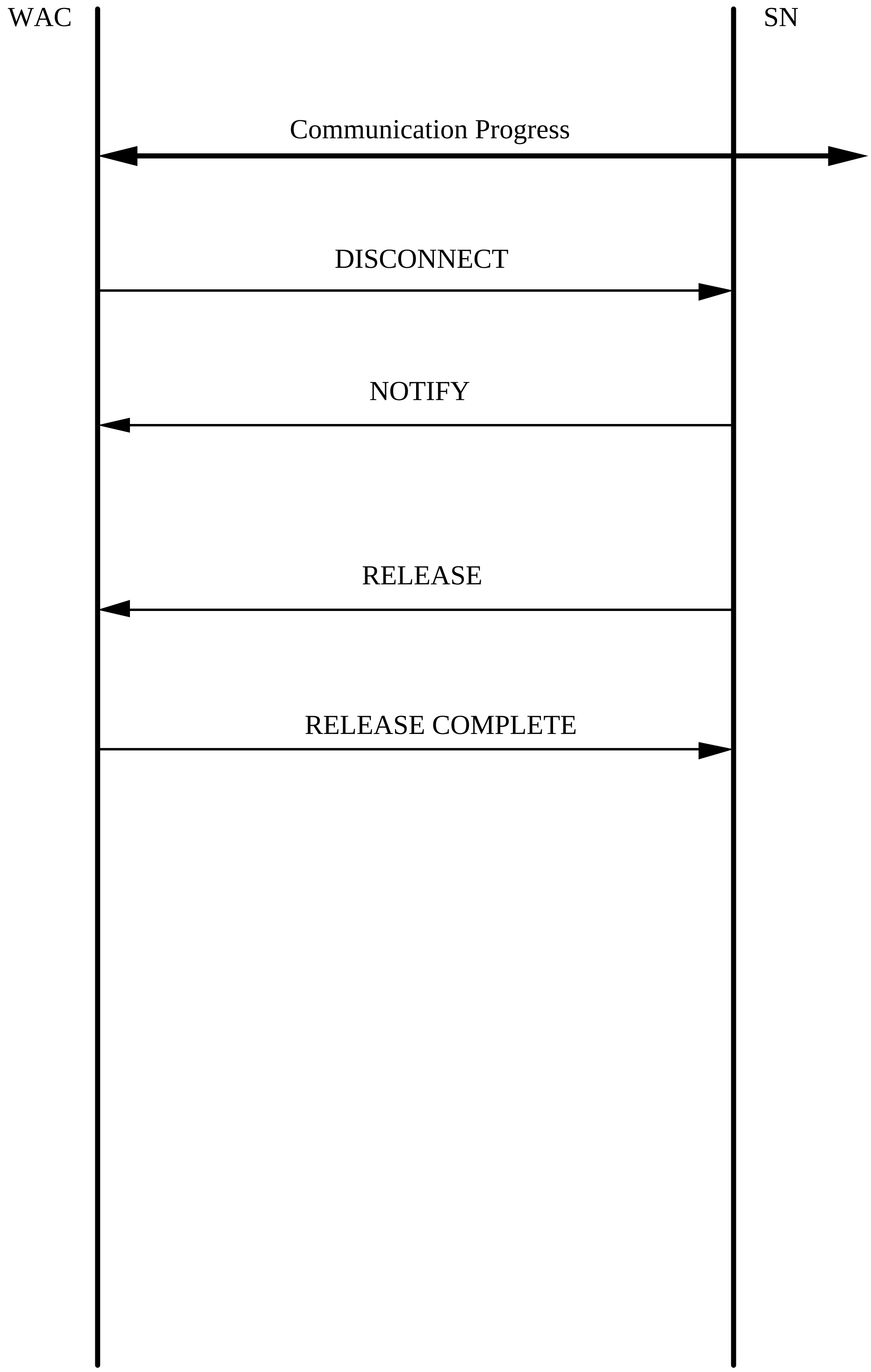

Figure A.2/C-IF3.04 Originating Call (originating party disconnection)

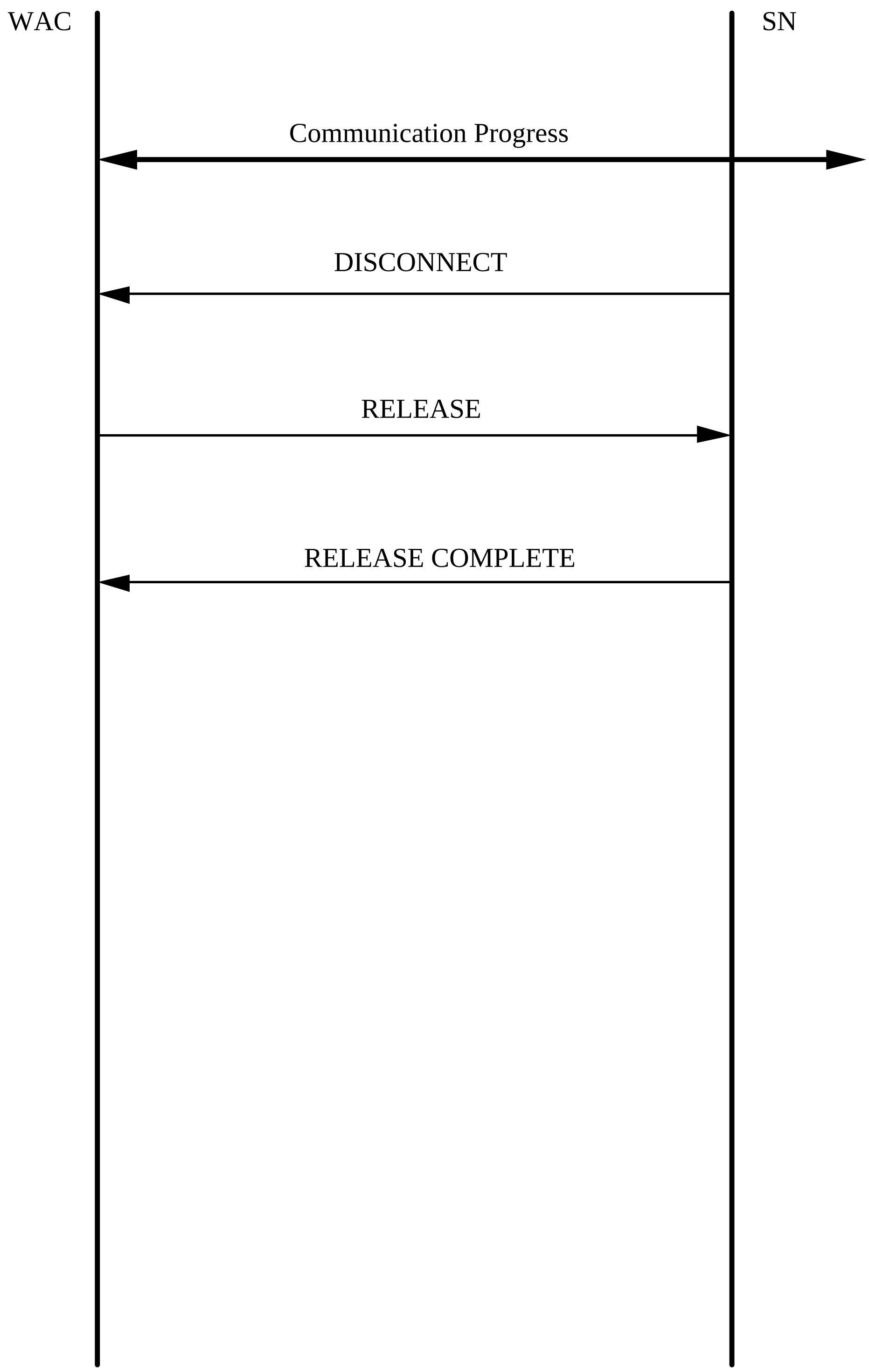

Figure A.3/C-IF3.04 Originating Call (teminating party disconnection)

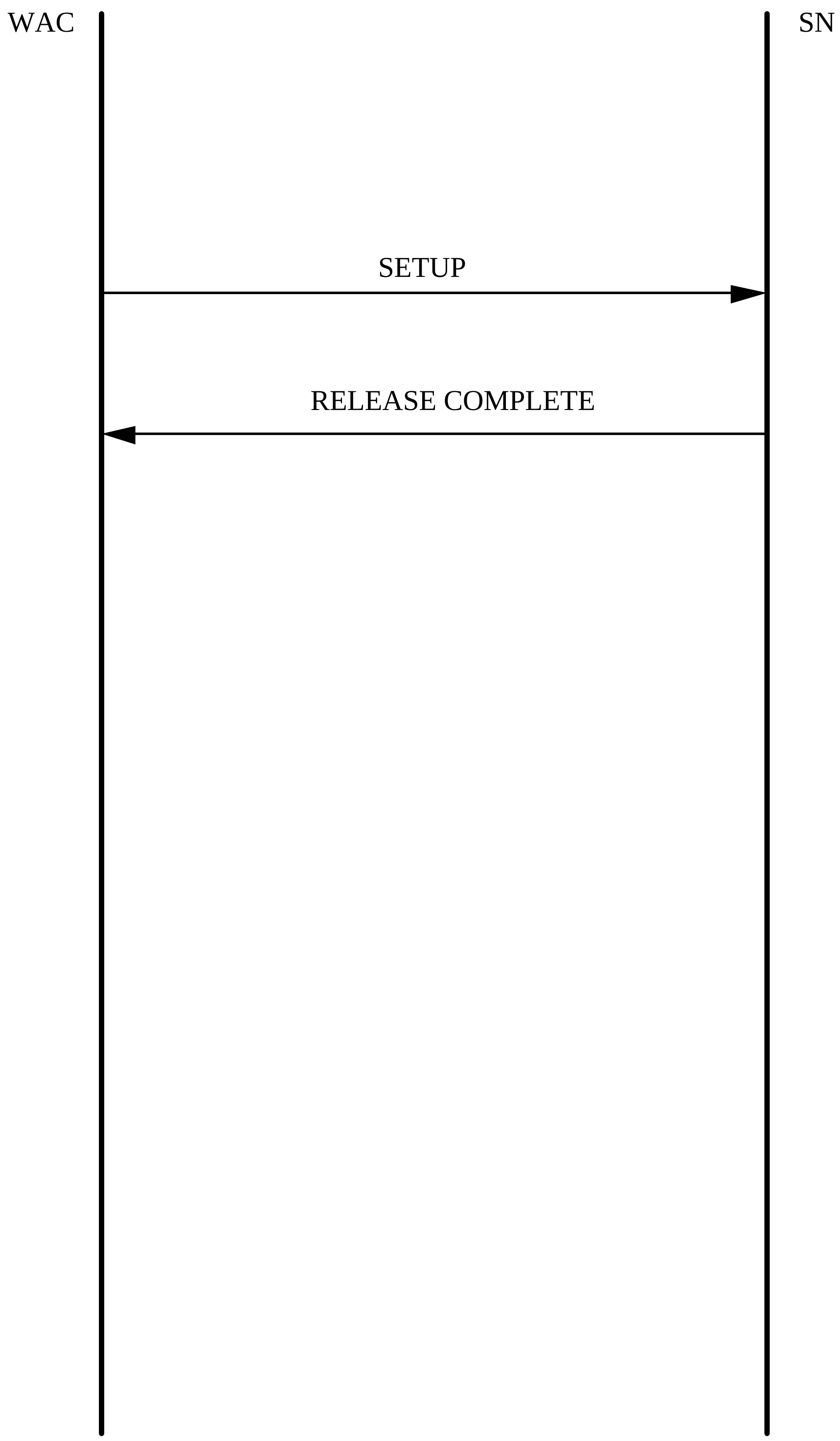

Figure A.4/C-IF3.04 Originating Call (not accepted by switch)

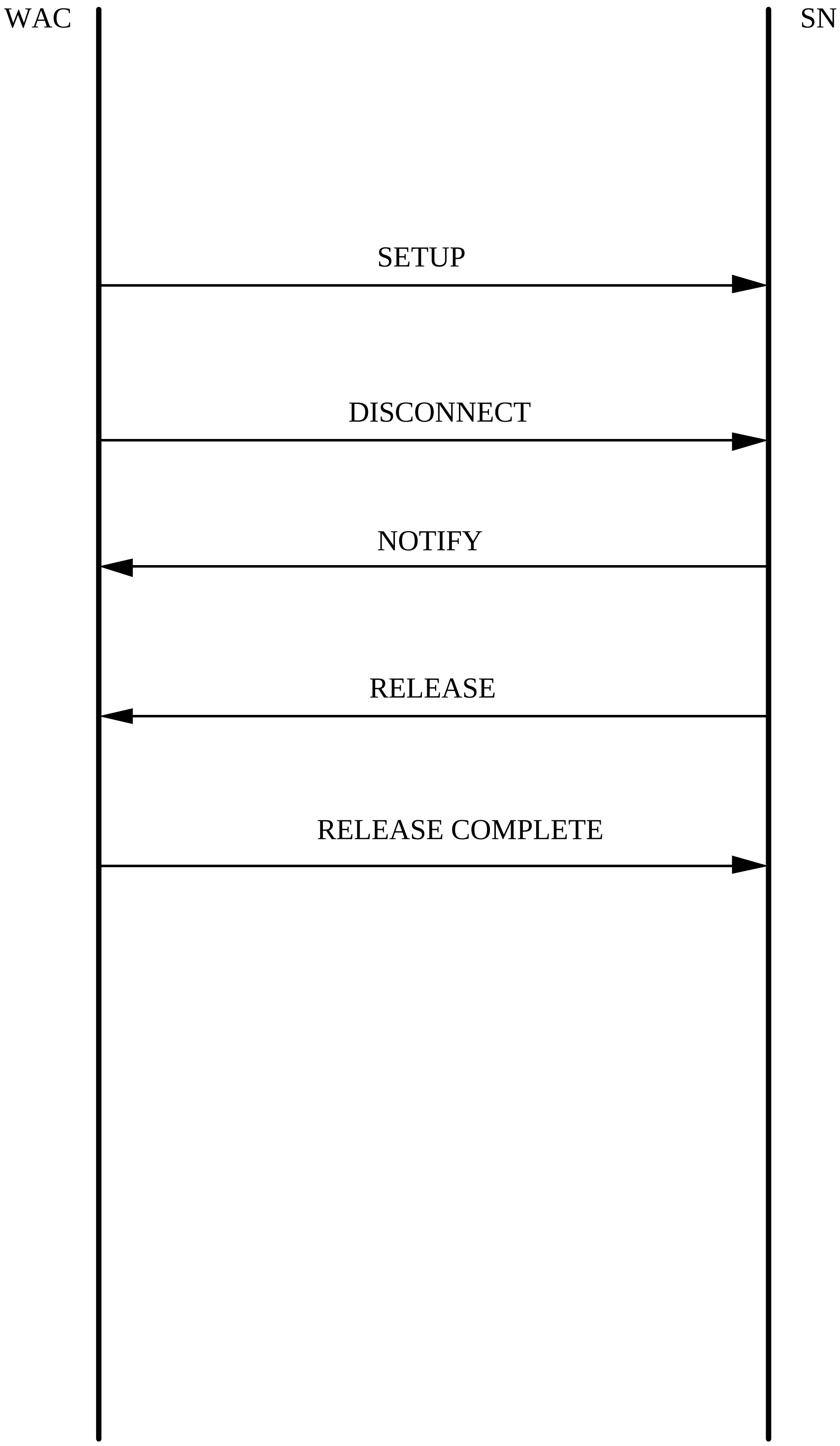

Figure A.5/C-IF3.04 Originating Call (customer abandoned the call)

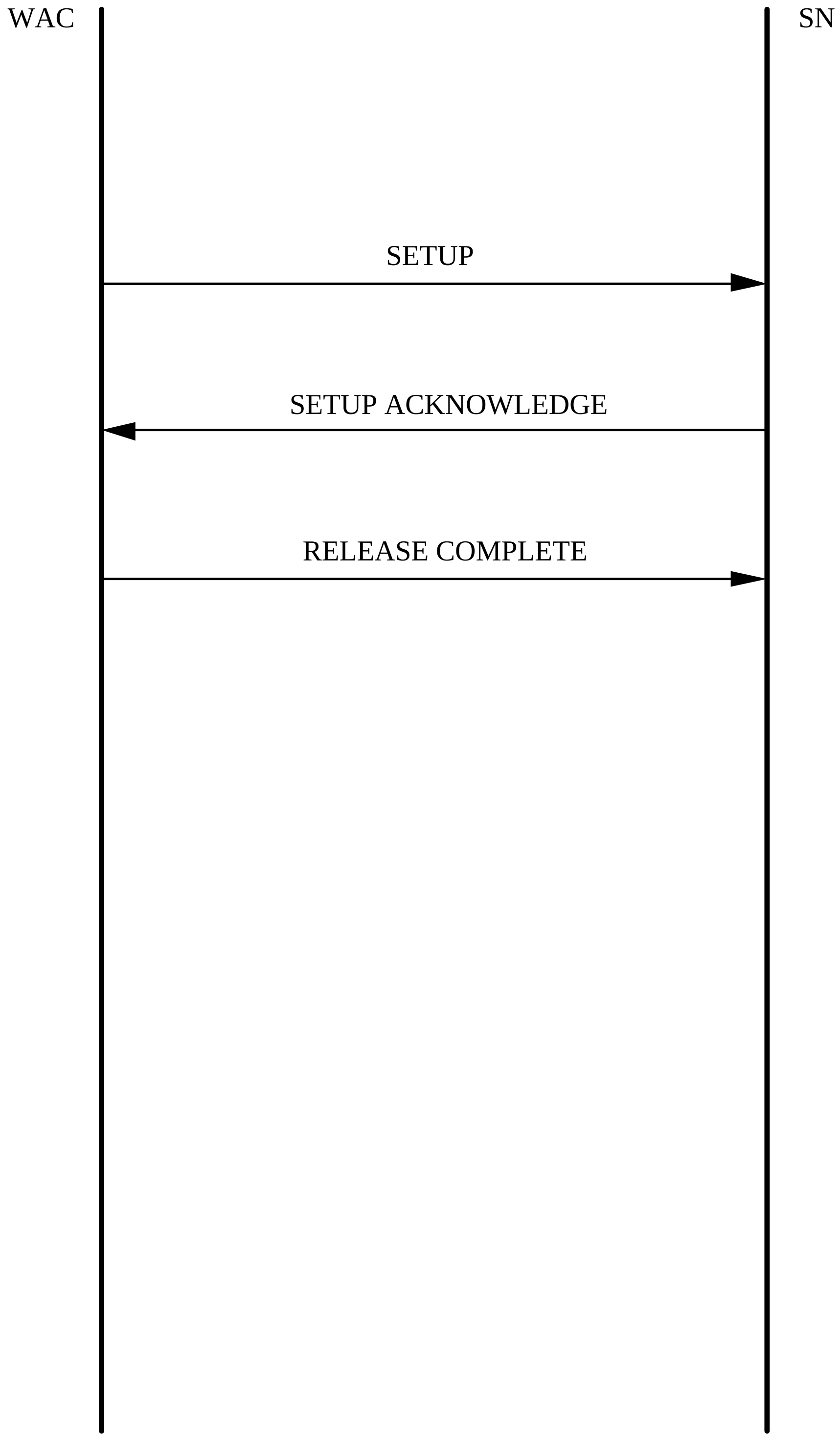

Figure A.6/C-IF3.04 Originating Call (WAC rejected the call)

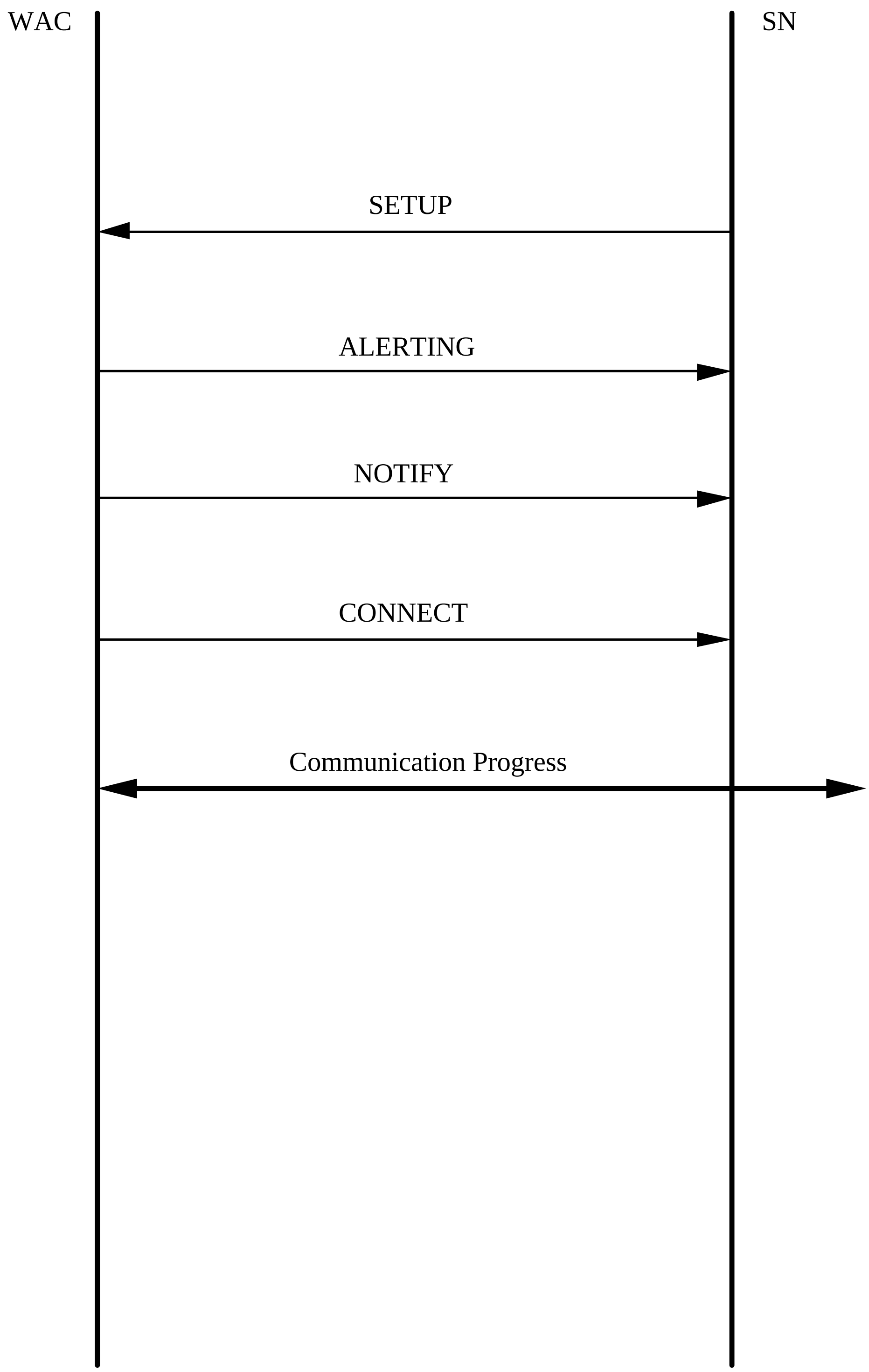

Figure A.7/C-IF3.04 Terminating Call (successful call setup)

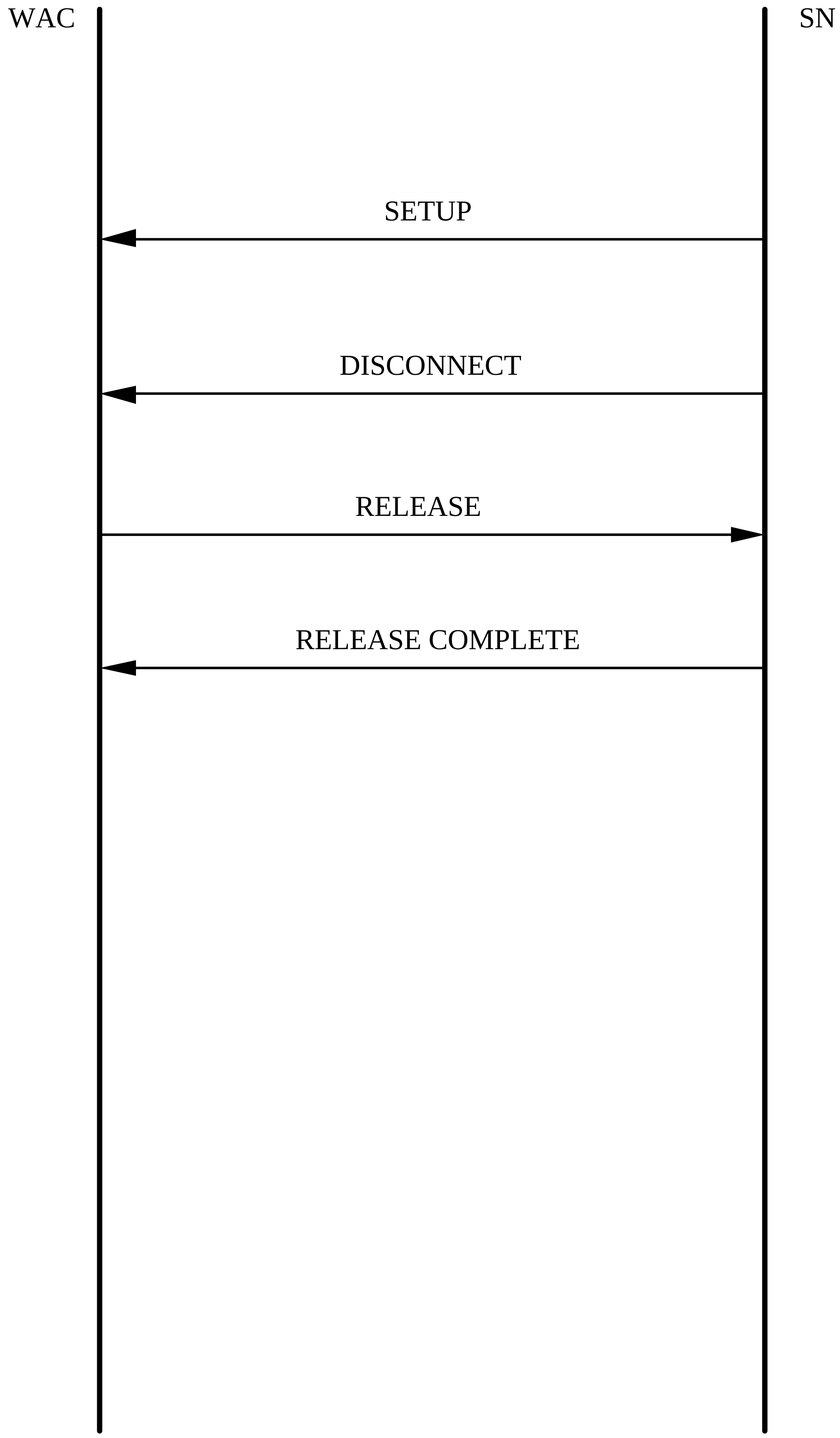

Figure A.8/C-IF3.04 Terminating Call (originating party abandoned the call)

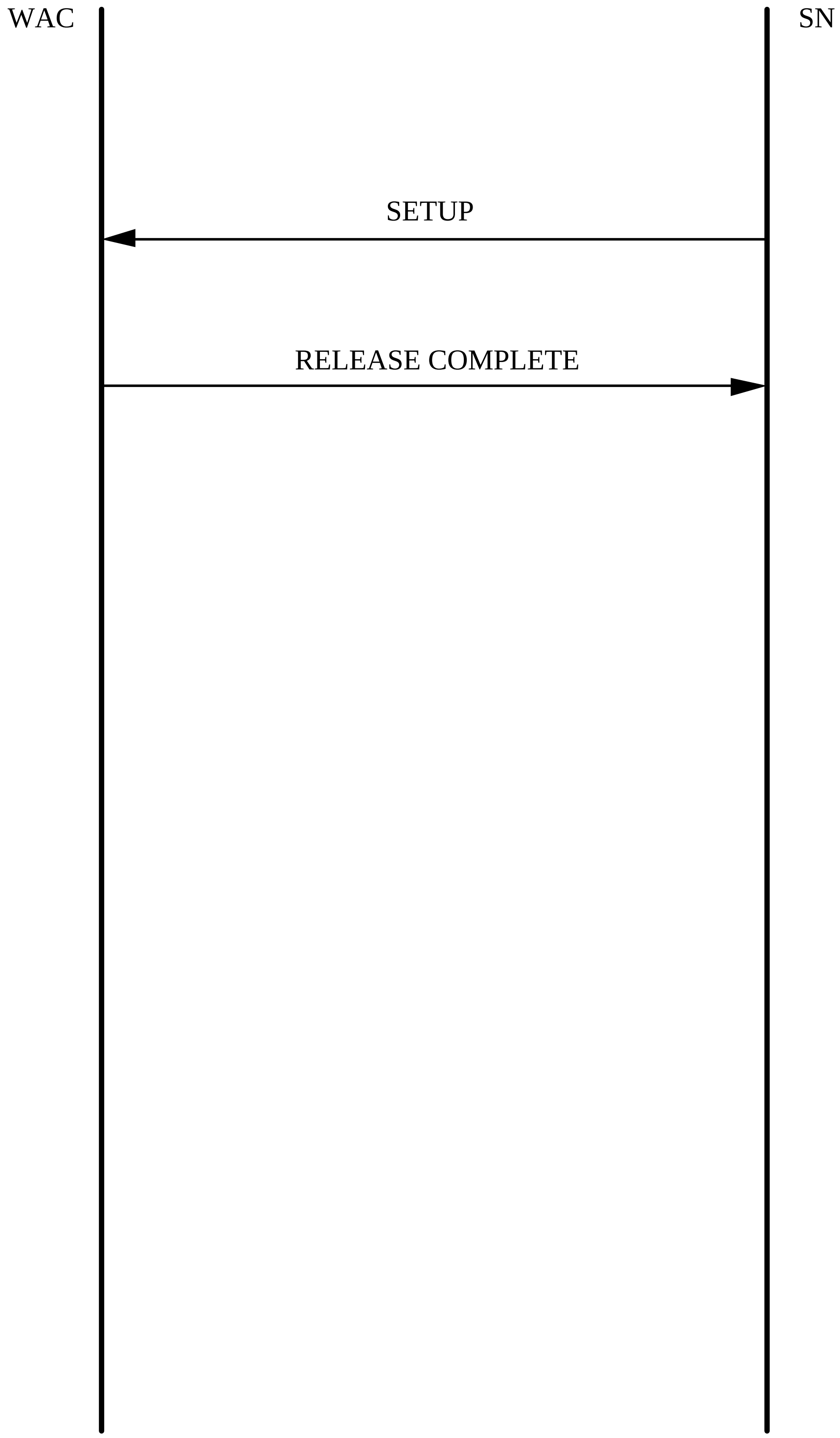

Figure A.9/C-IF3.04 Terminating Call (WAC rejected the call)

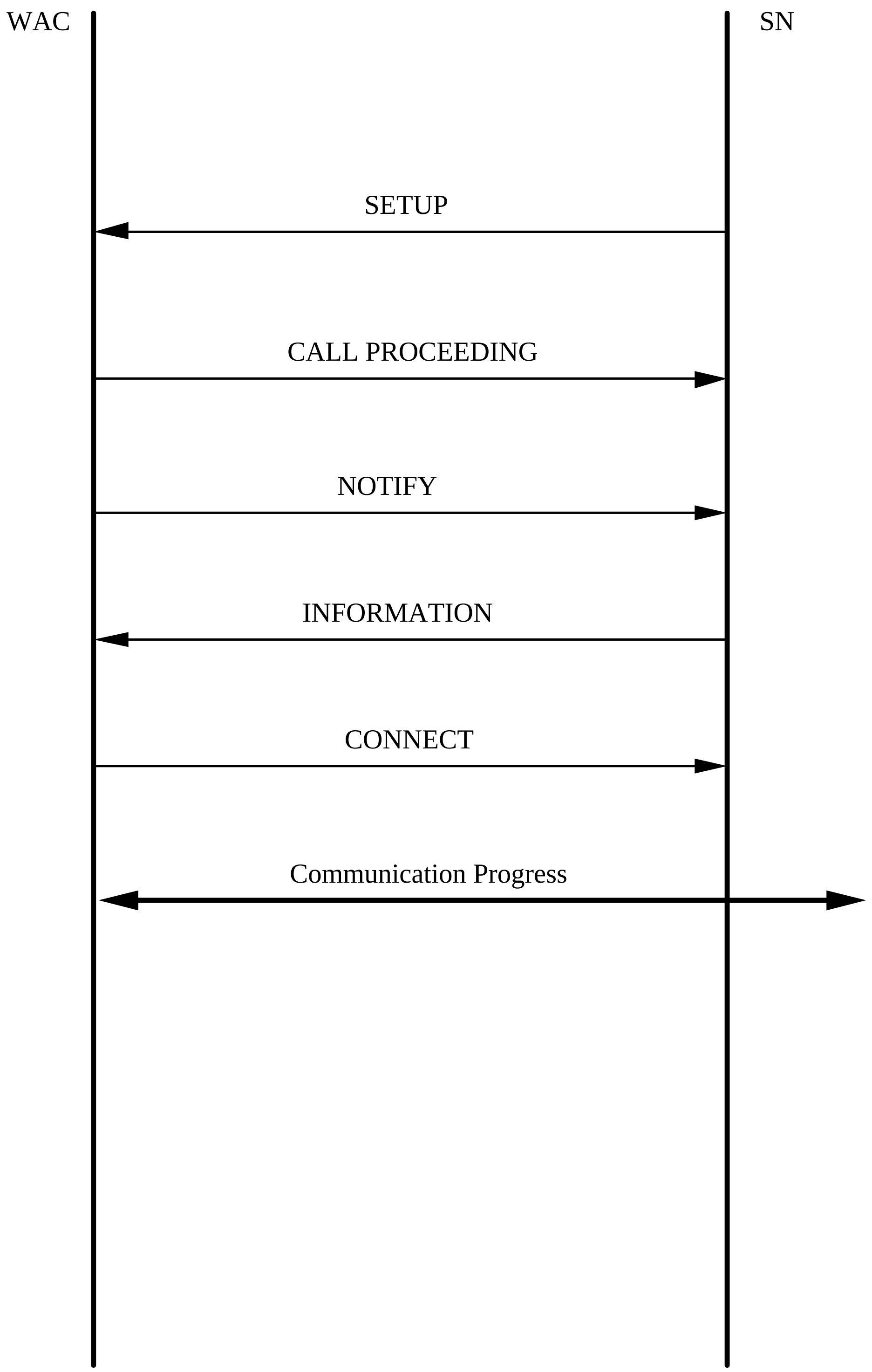

Figure A.10/C-IF3.04 Terminating Call with Direct Dialling In (successful call setup)

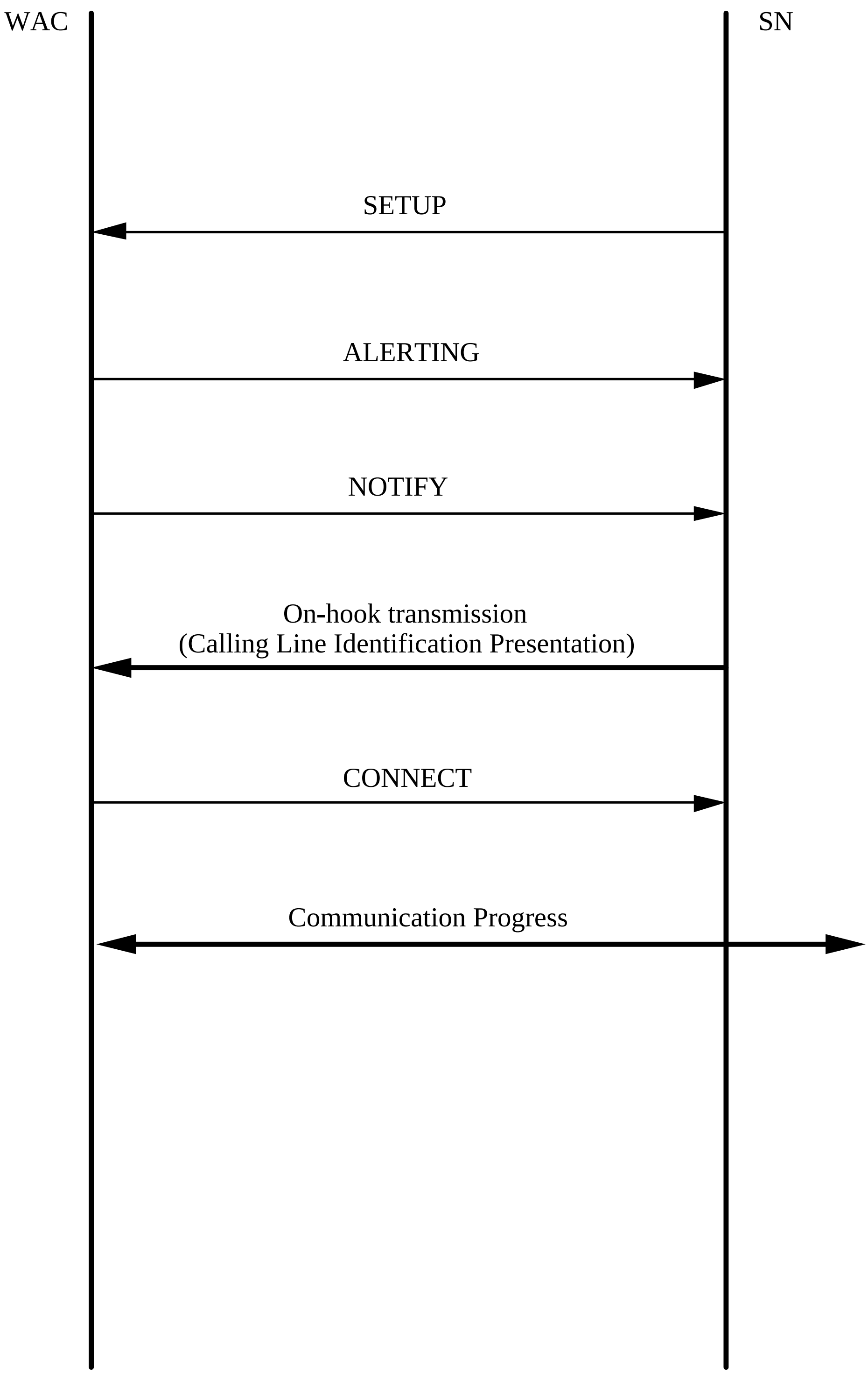

Figure A.11/C-IF3.04 Terminating Call with Calling Line Identification Presentation (successful call setup)

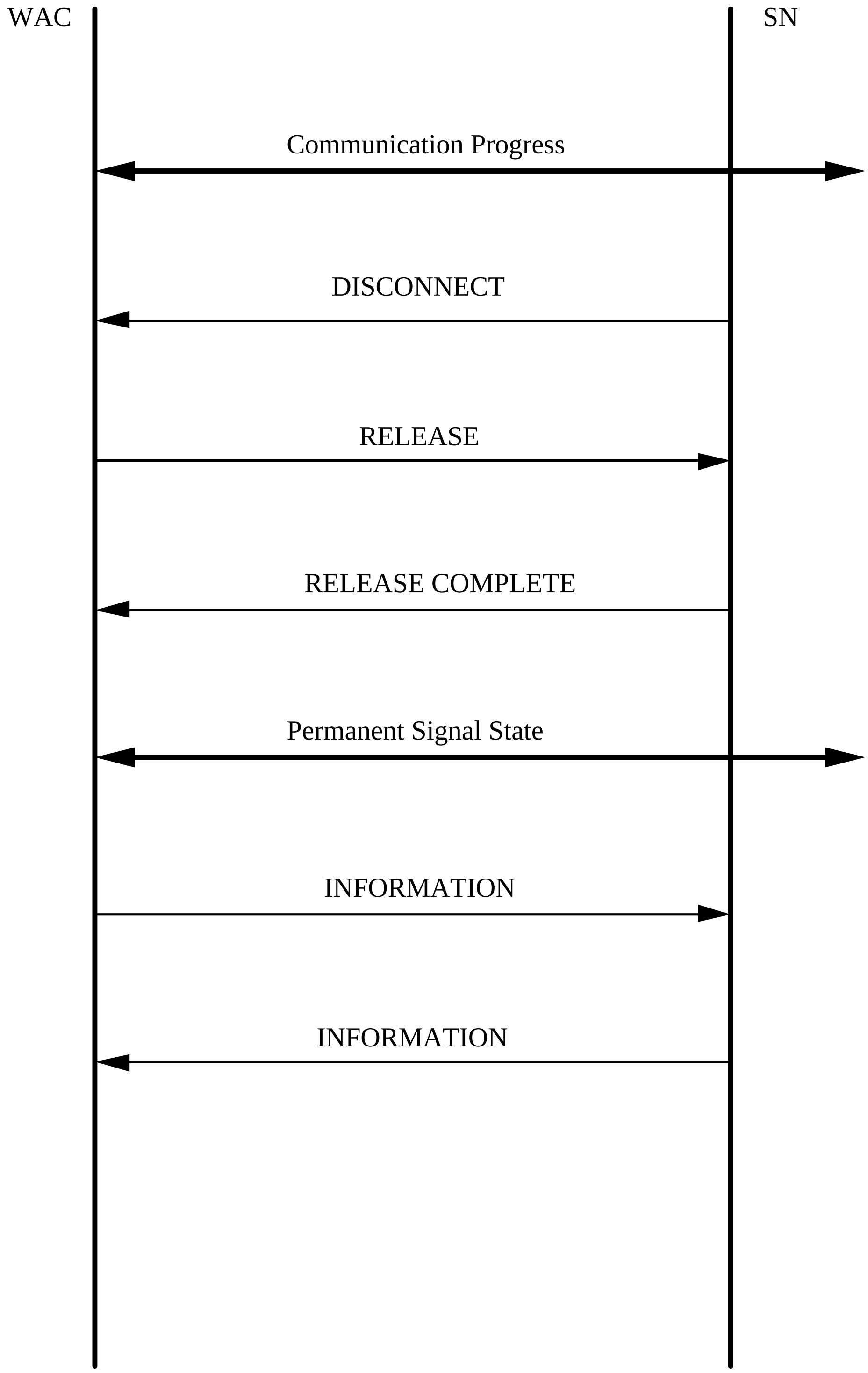

Figure A.12/C-IF3.04 Permanent signal state (customer is invalid off-hook)

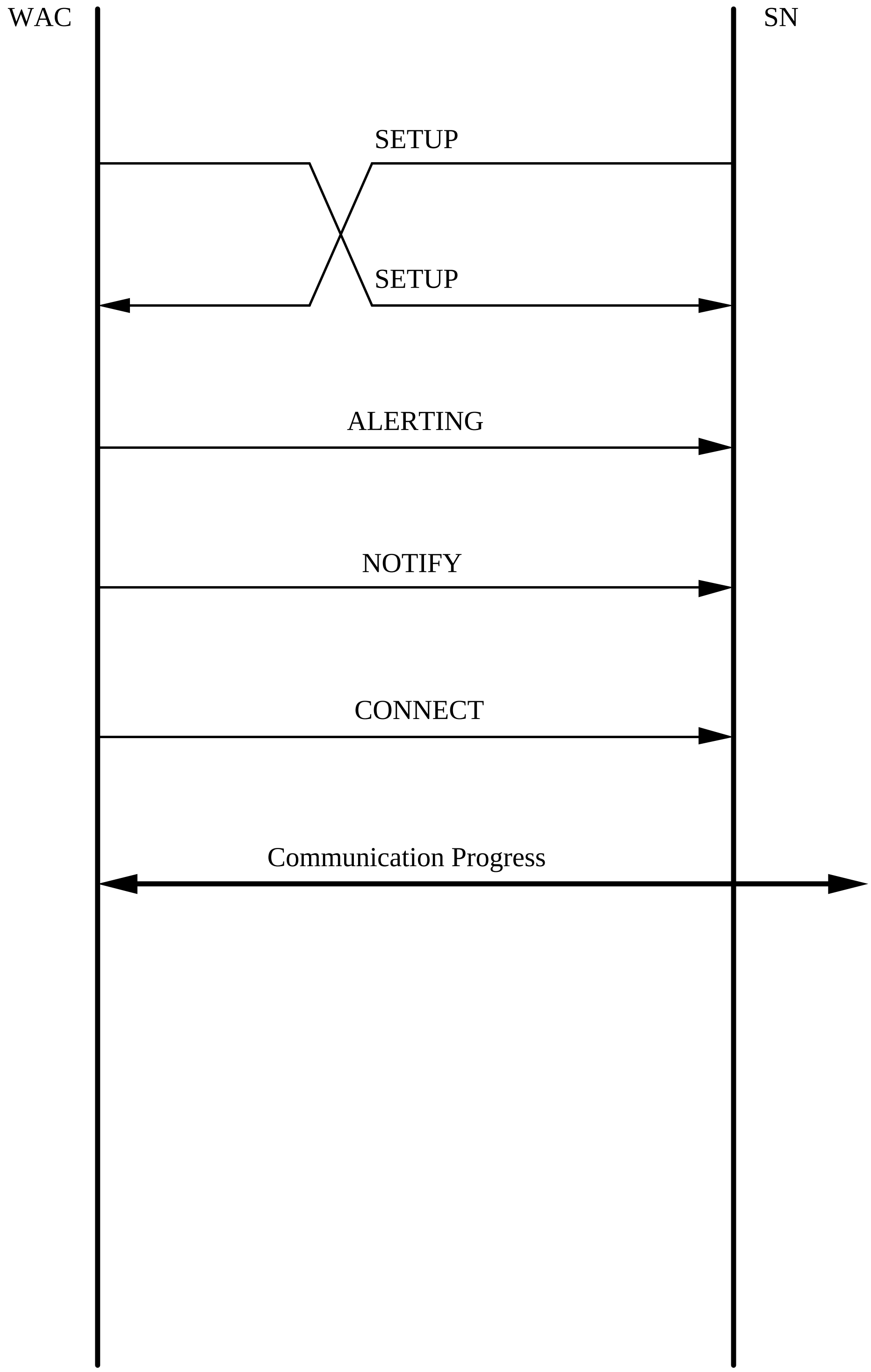

Figure A.13/C-IF3.04 Semi-normal sequence (Call Collision)

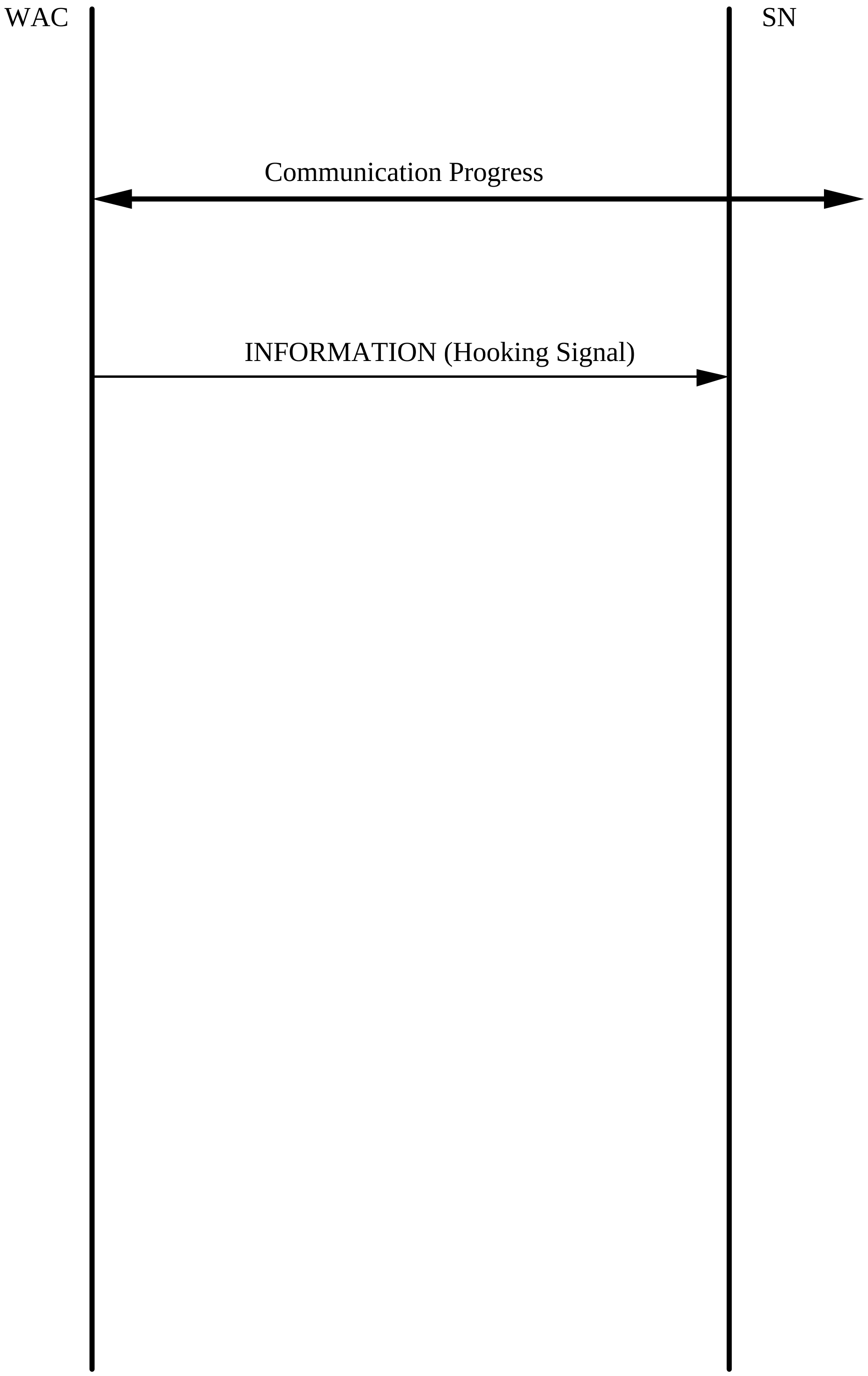

Figure A.14/C-IF3.04 Special Feature (Hooking Signal Transmission)

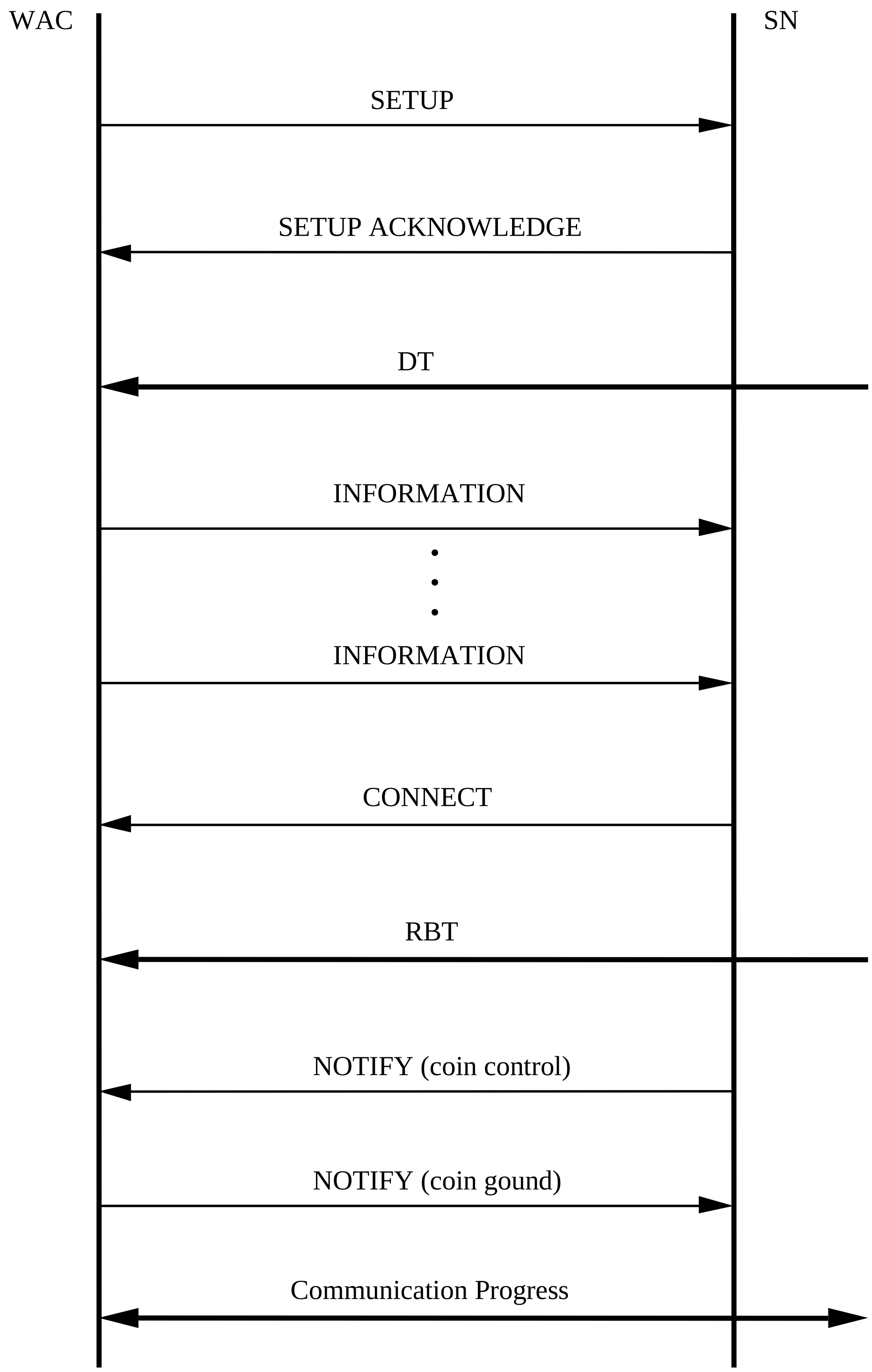

Figure A.15/C-IF3.04 Originating Call (pay phone service)