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ISDN Conformance Testing Guidelines:

Guidelines for Implementors of ISDN Customer Premises Equipment to Conform to Both National ISDN-1 and North American ISDN Users' Forum Layer 3 Basic Rate Interface Basic Call Control Abstract Test Suites

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[1] At Boulder, CO 80303.
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Leslie A. Collica and Dawn M. Hoffman

Advanced Systems Division
Computer Systems Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899-0001

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ISDN CONFORMANCE TESTING GUIDELINES -

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To Conform to Both National ISDN-1 and North American ISDN Users' Forum
Layer 3 Basic Rate Interface Basic Call Control
Abstract Test Suites

ABSTRACT

The following document is intended to provide information, as a supplement to the abstract test suites, to allow conformance to both the Bellcore National ISDN-1 (NI-1) and North American ISDN Users' Forum (NIUF) NIU.301 specifications for the ISDN Layer 3 Basic Rate Interface for Basic Call Control (user-side). It was developed to guide implementors in the design of customer premises equipment in a manner which would allow them to pass both the NI-1 and NIUF conformance tests. It may also be useful to vendors of test equipment, government procurement agents, and testing laboratories.

This testing guideline was developed by members of the North American ISDN Users' Forum's ISDN Conformance Testing Working Group and members of the Corporation for Open Systems' Task Force.

This document was approved in the North American ISDN Users' Forum as NIUF 429-94.

KEYWORDS

Abstract Test Suite, Basic Rate Interface, Conformance Testing, Customer Premises Equipment, Implementation Under Test, Integrated Services Digital Network, ISDN, Network Layer, Protocol Implementation Extra Information for Testing.

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List of Contributors	Organization
Tom Berriman	IDACOM/HP
Robert Blackshaw	Corporation for Open Systems
H. Gordon Brown	AT&T Bell Laboratories
Yi Chin	AT&T Bell Laboratories
Laurie Izzi	Bellcore
Chris Leising	Bellcore
Roxe Murray	Northern Telecom
Pierre Prescott	Tekelec
Suresh Ranganna	AT&T Bell Laboratories
Kirby Spencer	Joint Interoperability Test Center
Michelle Stevens	Bellcore
Al Vitenas	Bellcore

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1 INTRODUCTION

The following document is intended to provide information, as a supplement to the abstract test suites (ATS), to allow conformance to both the Bellcore National ISDN-1 (NI-1) [1] and North American ISDN Users' Forum (NIUF) NIU.301 [2] specifications for the ISDN Layer 3 Basic Rate Interface for Basic Call Control (user-side). It was developed to guide implementors in the design of customer premises equipment (CPE) in a manner which would allow them to pass both the NI-1 and NIUF conformance tests [3,4]. It may also be useful to vendors of test equipment, government procurement agents, and testing laboratories.

This document emphasizes the common set of implementation options at the message and information element levels of the specifications. Only the protocol events which have multiple options are addressed. This Guideline covers the common set of options of the specifications for the basic call control test suites for Layer 3.

Section 2 provides background and a description of this Guideline. Section 3 provides the selection of options at the message level which allows conformance to both specifications; section 4 provides selection at the information element level. Section 5 lists options for several general categories.

2 BACKGROUND

2.1 NIUF and NI-1 Test Suites

For conformance testing of ISDN basic rate access for NIUF and NI-1 specifications, comparison of the test suites showed:

- For Layer 1 - no difference between the test suites
- For Layer 2 - no difference between the test suites
- For Layer 3 - some difference between the test suites
- For Supplementary Services (SS) - 10 test suites for NI-1 SS; no test specification in NIUF.

For comparison of the Layer 3 basic call control specifications, several studies have addressed the question "What are the differences between the specifications?" During such a comparison for testing aspects, many similarities were found. The focus of the comparison was changed to address the question "Can CPE equipment be built to pass both NI-1 and NIUF test suites for Layer 3?" The answer to the second question seems to be more useful information for vendors of CPE and test equipment, procurement agents, and testing laboratories. This Guideline answers the question by showing the common set of options of the specifications for the basic call control test suites for Layer 3 which would allow conformance to both NI-1 and NIUF.

2.2 Contents of the Guideline

The Guideline is divided into message options, information element options, and general categories. Within these sections, groups of tests cases are described with the "intersecting" option which, if implemented, allows CPE to pass both the NIUF and NI-1 test cases for that particular test event. The tables list the test cases, the test messages sent to the CPE under test, and the preferred CPE response, which is the common set options. The notations given in brackets in the tables refer to the related protocol specification section(s).

This Guideline covers the common set of implementation options at the message level and at the information element level. While there may be two options allowed by each specification (NIU.301 and NI-1) for a particular Layer 3 test event, there may be only one option which is the same for both - the "common set" of options.

The following table illustrates an example of a test message which is an "unexpected" message.

Allowed CPE Actions Upon Receipt of an Unexpected Message		
NIUF [NIU.301 section 5.8.4]	**NI-1** [SR-1953 section 6.5.2]	**Guideline Recommendation** ("Common set" of options to Pass NIUF and NI-1)
A) return a STATUS message with cause #97, 98, or 101, or B) clear the call	A) return a STATUS message, or C) ignore the message	Return a STATUS message with cause #97, 98, or 101

In this case, the Guideline would list only the "intersecting" option: return a STATUS message with cause #97, 98, or 101. If STATUS with cause #97, 98, or 101 is implemented, CPE could Pass both the NIUF (NIU.301) and NI-1 test cases for unexpected messages. The Unexpected Messages in section 3.1.1 note the protocol sections of NIU.301 [NIU.301 5.8.4] and NI-1 [NI-1 6.5.2], refers to Table 1 for test cases, and describes the "common set" option as "in states U1-U10 - responding with a STATUS message with cause value 97, 98, or 101 would Pass both NIUF and NI-1 ATSs." In Table 1, the specific test cases and test messages are listed along with the preferred CPE response (the common set option).

3 NIU.301 AND NI-1 MESSAGE OPTIONS

This section lists the common set of message options for each particular protocol event which, if implemented, would allow CPE to pass both test suites.

3.1 Unexpected or Unrecognized Messages

3.1.1 For unexpected messages (except RELEASE or RELEASE COMPLETE) received in any state other than the Null state, specified in NIU.301 5.8.4 and NI-1 6.5.2:

- in states U1-U10 - responding with a STATUS message with cause value 97, 98, or 101 would Pass both NIUF and NI-1 ATSs.

- in states U11 and U19 - responding with either
  1) a STATUS message (with cause value 97, 98, or 101), or
  2) no response

  would allow CPE to pass both NIUF and NI-1 ATSs.

Table 1 contains the list of these 45 unexpected messages test cases.

3.1.2 For unrecognized messages, as specified in NIU.301 5.8.4 and NI-1 6.5.2 - responding with a STATUS message with cause value 97, 98, or 101 would Pass both NIUF and NI-1 ATSs.

Table 1 contains the two unrecognized message type test cases.

3.2 Nonmandatory Information Element Content Error

For messages which contain a nonmandatory information element content error as specified in NIU.301 5.8.7.2 and NI-1 6.5.3.2:

• Responding by "acting on the test message" (and not also sending a STATUS message), would Pass both NIUF and NI-1 ATSs.

Table 2 contains the list of 16 test cases.

3.3 Other Message Option Test Cases

• Responding according to the Preferred CPE Response in Table 3 would allow CPE to Pass both NIUF and NI-1 ATSs.

Table 3 contains the list of five test cases.

4 NIU.301 AND NI-1 INFORMATION ELEMENT OPTIONS

In this section, the information element (IE) options are listed which would allow CPE to pass both NI-1 and NIUF ATSs. The expected response at the message level is already the same in both NIU.301 and NI-1. The messages are listed in the tables for information only; it is the particular value or presence of an IE which is emphasized in the Preferred CPE Response column of the test case tables.

4.1 Cause values. In these cases, it is the particular cause value(s) which would allow CPE to pass both NI-1 and NIUF ATSs; the messages expected in response to the test events are already the same in both NIU.301 and NI-1. The message and the particular cause value option(s) are listed as the preferred CPE response in Table 4. Although the NI-1 specification does not require specific cause values in these cases, in several cases, the intersecting cause value is also the "preferred" cause value specified in NI-1.

• Responding according to the Preferred CPE Response in Table 4 would Pass both NIUF and NI-1 ATSs. Table 4 contains the list of 25 test cases.

4.2 Information Element Fields

The results of the comparison of the Information Element fields for each message specified in NIU.301 and NI-1 are included in Tables 7 and 8. Comments and recommendations for testing are included in the tables.

5 GENERAL CATEGORIES

5.1 Call Reference. NI-1 requires only the one octet call reference value, while NIU.301 allows for one or two octet call reference values. The addenda to NIU.301 [5] (June 1993) specifies only the one octet call reference value. No test cases are affected, since a three octet call reference value is used in the call reference length error test.

• Implementation of the single octet call reference would allow the CPE to pass both NI-1 and NIUF ATSs.

5.2 Tests Unique to NIU.301

Several of these tests are optional depending upon implementation capabilities. The test case selection is determined from answers to the NIU.301 Protocol Implementation Extra Information for Testing (PIXIT) questionnaire which is completed by a CPE vendor prior to testing. Table 5 contains the list of 17 test cases.

5.3 Tests Unique to NI-1.

5.3.1 STATUS ENQUIRY received in states other than U10. NIU.301 specifies only the occurrence of the STATUS ENQUIRY received in U10, and, therefore tests STATUS ENQUIRY only in state U10. NI-1 defines the behavior of STATUS ENQUIRY received in all states. Table 6 lists the nine test cases. The addenda to NIU.301 (June 1993) specifies the response to STATUS ENQUIRY in all states. The related STATUS ENQUIRY tests will be added to the next version of the NIU.301 test suites.

• Implementation of STATUS ENQUIRY procedures according to NI-1 would allow CPE to pass both NI-1 and NIUF ATSs.

5.3.2 Terminal Initialization. For basic call control, NI-1 requires terminal initialization, while NIU.301 does not require terminal initialization. For NIUF, it is currently outside of the scope of testing NIU.301. However, NIUF Implementation Agreement NIU89-311 [6] does provide optional procedures for terminal initialization. See Table 6 for the list of 20 test cases.

• Implementation of terminal initialization procedures according to NI-1 would allow CPE to pass both NI-1 and NIUF ATSs.

5.4 Error handling procedures. Although the error handling procedures referenced in NIU.301 section 5.8.4 are not defined in NI-1 (SR-NWT-001953), NI-1 does provide direction to the implementor by pointing to Section 5.8 of ANSI T1.607 [7]. The introduction in the *Generic Guidelines for ISDN Terminal Equipment on Basic Access Interfaces revision 1* [1] states:

> "Some ANSI requirements that do not impact terminal portability or compatibility with National ISDN-1 switches are not addressed in SR-NWT-001953. Specifically, procedures for handling error conditions defined in Section 5.8 of ANSI T1.607-1990 that do not affect terminal portability are not included in SR-NWT-001953. However, terminals will still be compatible with switches that conform to the NI-1 agreement if designed in accordance with SR-NWT-001953 plus the requirements in ANSI T1.607-1990 for procedures to handle error conditions that are not included in SR-NWT-001953."

• Implementing the error handling procedures as specified in NIU.301 section 5.8.4 would allow CPE to pass both NIUF and NI-1 ATSs.

5.5 Optional and Uniquely Supported Messages.

The list of optional messages is provided in Table 9 as information. The majority of these messages are for use for Supplementary Services. These messages do not impact the testing.

Table 1. MESSAGE OPTIONS -
Unexpected and Unrecognized Message Test Cases
[NIU.301 5.8.4 / NI-1 6.5.2]

Test Case # (state xx)	Test Message (Receive Event)	Preferred CPE Response
NLxx_I01 (xx = U1,U4,U7,U8,U10)	ALERT	STATUS (cause = 97,98,101)
NLxx_I01 (xx= U11,U19)	ALERT	STATUS (cause = 97,98,101) or No response
NLxx_I03 (xx = U3,U4,U7,U8,U10)	CALL PROCEEDING	STATUS (cause = 97,98,101)
NLxx_I03 (xx= U11,U19)	CALL PROCEEDING	STATUS (cause = 97,98,101) or No response
NLxx_I09 (xx= U1,U7,U8,U10)	PROGRESS	STATUS (cause = 97,98,101)
NLxx_I06 (xx= U11,U19)	PROGRESS	STATUS (cause = 97,98,101) or No response
NLxx_I09 (xx= U1,U7,U8,U10)	CONNECT	STATUS (cause = 97,98,101)
NLxx_I09 (xx= U11,U19)	CONNECT	STATUS (cause = 97,98,101) or No response
NLxx_I11 (xx= U2,U3,U4,U7,U8,U10)	SETUP ACKNOWLEDGE	STATUS (cause = 97,98,101)
NLxx_I11 (xx= U11,U19)	SETUP ACKNOWLEDGE	STATUS (cause = 97,98,101) or No response
NLxx_I13 (xx= U1,U2,U3,U4,U7,U10)	CONNECT ACKNOWLEDGE	STATUS (cause = 97,98,101)
NLxx_I13 (xx= U11,U19)	CONNECT ACKNOWLEDGE	STATUS (cause = 97,98,101) or No response
NLxx_I14 (xx= U19)	DISCONNECT	STATUS (cause = 97,98,101) or No response
NLxx_I19 (xx= U1)	INFORMATION	STATUS (cause = 97,98,101)
NLxx_I14 (xx= U19)	INFORMATION	STATUS (cause = 97,98,101) or No response
NLxx_N120 (xx= U1,U10)	Unrecognized message type	STATUS (cause = 97,98,101)

Table 2. MESSAGE OPTIONS -
Nonmandatory Information Element (IE) Content Error Test Cases
[NIU.301 5.8.7.2 / NI-1 6.5.3.2]

Test Case # (state xx)	Test Message (Receive Event)	Preferred CPE Response
NLxx_N218 (xx=U1)	CALL PROCEEDING (Progress indicator IE length mismatch)	No response
NLxx_N219 (xx=U1)	CALL PROCEEDING (Progress indicator IE conflicting values)	No response
NLxx_N220 (xx=U0)	CALL PROCEEDING (Signal IE length mismatch)	No response
NLxx_N222 (xx=U4)	PROGRESS (Signal IE length mismatch)	No response
NLxx_N224 (xx=U0)	SETUP (Progress indicator IE conflicting values)	CALL PROCEEDING, ALERT, or CONNECT
NLxx_N225 (xx=U4)	CONNECT (Progress indicator IE length mismatch)	CONNECT ACKNOWLEDGE or No response
NLxx_N226 (xx=U4)	CONNECT (Progress indicator IE conflicting values)	CONNECT ACKNOWLEDGE or No response
NLxx_N227 (xx=U1)	SETUP ACKNOWLEDGE (Progress indicator IE length mismatch)	No response
NLxx_N228 (xx=U0)	SETUP ACKNOWLEDGE (Progress indicator IE conflicting values)	No response
NLxx_N229 (xx=U8)	CONNECT ACKNOWLEDGE (Unrecognized nonmandatory IE error)	No response
NLxx_N230 (xx=U10)	DISCONNECT (User-user/Feature indicator length mismatch)	RELEASE
NLxx_N231 (xx=U11)	RELEASE (Cause IE length mismatch)	RELEASE COMPLETE
NLxx_N233 (xx=U3)	INFORMATION (Signal IE length mismatch)	No response
NLxx_N238 (xx=U0)	SETUP (Called party subaddress conflicting values)	CALL PROCEEDING, ALERT, or CONNECT
NLxx_N238 (xx=U0)	SETUP (Low layer compatibility length mismatch)	CALL PROCEEDING, ALERT, or CONNECT
NLxx_N240 (xx=U0)	SETUP (High layer compatibility length mismatch)	CALL PROCEEDING, ALERT, or CONNECT

Table 3. MESSAGE OPTIONS - Miscellaneous Test Cases		
Test Case #	**Test Message (Receive Event)**	**Preferred CPE Response**
NLU1_I14	DISCONNECT [NIU.301 5.3.4.2 and 5.8.4/NI-1 6.4]	RELEASE
NLU0_N211[a]	Mandatory Information Element out of sequence [NIU.301 5.8.5.1/]	RELEASE COMPLETE (cause = 96)
NLU0_N234	SETUP with Unrecognized nonmandatory IE [NIU.301 5.8.7.1/NI-1 6.5.3.1]	CALL_PROCEEDING, or ALERT or CONNECT
NLU3_N234	ALERT with Unrecognized nonmandatory IE [NIU.301 5.8.7.1/NI-1 6.5.3.1]	No response
NLU1_V243[a]	B channel selection collision [NIU.301 5.2.1]	CALL_PROCEEDING, or ALERT or CONNECT

[a] See section 5.4 of this Guidelines.

Table 4. INFORMATION ELEMENT OPTIONS - Cause Value[a] Test Cases			
Test Case #	Test Message (Receive Event)	Preferred CPE Response	
		Message	Cause
Call Reference Procedural Errors [NIU.301 5.8.3.2(1) / NI-1 6.5.1]			
NLU0_I01	ALERT (Unexpected)	RELEASE COMPLETE	81
NLU0_I03	CALL PROCEEDING (Unexpected)	RELEASE COMPLETE	81
NLU0_I07	PROGRESS (Unexpected)	RELEASE COMPLETE	81
NLU0_I09	CONNECT (Unexpected)	RELEASE COMPLETE	81
NLU0_I11	SETUP ACKNOWLEDGE (Unexpected)	RELEASE COMPLETE	81
NLU0_I13	CONNECT ACKNOWLEDGE (Unexpected)	RELEASE COMPLETE	81
NLU0_I14	DISCONNECT (Unexpected)	RELEASE COMPLETE	81
NLU0_I15	RELEASE (Unexpected)	RELEASE COMPLETE	81
NLU0_I14	INFORMATION (Unexpected)	RELEASE COMPLETE	81
NLU1_N213	CALL PROCEEDING (Call reference value not in use)	RELEASE COMPLETE	81
NLU8_N213	CONNECT (Call reference value not in use)	RELEASE COMPLETE	81
NLU10_N213	DISCONNECT (Call reference value not in use)	RELEASE COMPLETE	81
Mandatory Information Element (IE) Content Error [NIU.301 5.8.6.2]			
NLU1_N133	CALL PROCEEDING (Channel identification with length mismatch)	STATUS or Clear Call[b]	100
NLU4_N135	PROGRESS (Progress indicator length mismatch)	STATUS or Clear Call[b]	100
NLU0_N139	SETUP (Bearer capability undefined)	RELEASE COMPLETE	100
NLU1_N133	SETUP (Channel identification with conflicting values)	RELEASE COMPLETE	98 or 100
NLU1_N144	SETUP ACKNOWLEDGE (Channel identification with length mismatch)	STATUS or Clear Call[b]	100
NLU10_N159	DISCONNECT (Cause length mismatch)	RELEASE	100
NLU10_N160	RELEASE (Cause length mismatch)	RELEASE COMPLETE	100

Table 4. Cause Value Test Cases (continued)			
Test Case #	**Test Message**	**Preferred CPE Response**	
		Message	**Cause**
Mandatory Information Element Missing [NIU.301 5.8.6.1]			
NLU1_N122	CALL PROCEEDING	STATUS or Clear Call[b]	96
NLU4_N123	PROGRESS	STATUS or Clear Call[b]	96
NLU0_N124	SETUP	RELEASE COMPLETE	96
NLU1_N126	SETUP ACKNOWLEDGE	STATUS or Clear Call[b]	96
Cause values [Other reference sections]			
NLU10_V18	STATUS ENQUIRY [NIU.301 5.8.10 / NI-1 6.5.5]	STATUS (Call State = U10)	30
Cause (CA) Value and Call State (CS)			
NLU10_I98	Data Link Establishment [NIU.301 5.8.9]	STATUS	CA=30 CS=U10

[a] The preferred cause value is the information emphasized in this table. The Message of the Preferred CPE Response is already the same in both specifications.

[b] The Clear Call message is a DISCONNECT, RELEASE or RELEASE COMPLETE

Table 5. TEST CASES UNIQUE TO NIU.301 ATS	
NIU.301 Test Case # (state xx)	**Test Message (Event)**
NLU2_I01	ALERT (Unexpected) [NIU.301 6.5.2]
NLU2_I09	CONNECT (Unexpected) [NIU.301 6.5.2]
NLU4_N137	PROGRESS with mandatory Information Element (IE) error (Progress indicator with conflicting values) [NIU.301 5.8.6.2]
NLU3_N216	ALERT with nonmandatory IE error (Progress indicator with length mismatch) [NIU.301 5.8.7.2]
NLU3_N217	ALERT with nonmandatory IE error (Progress indicator with conflicting values) [NIU.301 5.8.7.2]
NLU2_N221	CALL PROCEEDING with nonmandatory IE error (Channel identification with conflicting values) [NIU.301 5.8.7.2]
NLU0_N223	SETUP with nonmandatory IE error (User-user with length mismatch) [NIU.301 5.8.7.2]
Optional Test Cases	
NLU4_T192	Timer T301 expiry (selected if T301_IMPLEMENTED)
NLU2_T195	Timer T304 expiry (selected if T304_IMPLEMENTED)
NLU3_T200	Timer T310 expiry (selected if T310_IMPLEMENTED)
NLxx_V241 (xx=U1,U2,U3, U4,U10,U11,U19)	SETUP with Call Reference (CR) flag=0; CR value in use (2 simultaneous calls) (selected if CPE supports simultaneous calls on two B-Channels)

Table 6. TEST CASES UNIQUE TO NI-1 ATS	
NI-1 Test Case # (state xx)	**Test Message (Event)**
NLxx_V18 * (xx=U0,U1,U2,U3,U4, U7,U8,U11,U19)	STATUS ENQUIRY [NI-1 6.5.5]
Terminal Initialization test cases in NI-1	
NLU0NI_V001	Verify that the IUT sends an INFOrmation message with Service Profile Identification Information Element (SPI IE) = Service Profile Identifier (SPID) when the Implementation Under Test (IUT) is in state U0NI (not initialized). [NI-1 8.5.2]
NLU0S_V002	Verify that the IUT does not respond after receiving an INFO with the Endpoint Identifier (EID) = User Service Identifier (USID), Terminal Identifier (TID) when the IUT is in state U0S (IUT sent the SPID). [NI-1 8.5.2]
NLU0IR_V002	Verify that the IUT does not respond after receiving an INFO with EID=USID,TID when the IUT is in state U0IR (tester requested a SPID, SPID sent). [NI-1 8.5.3]
NLU0I_V002	Verify that the IUT does not respond after receiving an INFO with EID=USID,TID when the IUT is in state U0I (initialized). [NI-1 8.5.3]
NLU0S_V003	Verify that the IUT does not respond after receiving an INFO with Cause = invalid IE contents (100) when the IUT is in state U0S (IUT sent the SPID). [NI-1 8.5.2]
NLU0IR_V003	Verify that the IUT does not respond after receiving an INFO with Cause = invalid IE contents (100) when the IUT is in state U0IR (tester requested a SPID). [NI-1 8.5.2]
NLU0S_V004	Verify that the IUT sends an INFO with SPI=SPID after receiving an INFO with an Information Request (IRQ) = prompt,TID when the IUT is in state U0S (IUT sent the SPID). [NI-1 8.5.3]
NLU0SR_V004	Verify that the IUT sends an INFO with SPI=SPID after receiving an INFO with IRQ=prompt,TID when the IUT is in state U0SR (tester rejected the SPID). [NI-1 8.5.3]
NLU0I_V004	Verify that the IUT sends an INFO with SPI=SPID after receiving an INFO with IRQ=prompt,TID when the IUT is in state U0I (Initialized). [NI-1 8.5.3]
NLU0S_V005	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete, EID=USID,TID when the IUT is in state U0S (IUT sent the SPID). [NI-1 8.5.3]
NLU0IR_V005	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete, EID=USID,TID when the IUT is in state U0IR (tester requested a SPID, SPID sent). [NI-1 8.5.3]

Table 6. TEST CASES UNIQUE TO NI-1 ATS (continued)	
NI-1 Test Case # (state xx)	**Test Message (Event)**
NLU0I_V005	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete, EID=USID,TID when the IUT is in state U0I (initialized). [NI-1 8.5.3]
NLU0S_N006	Verify that the IUT does not respond after receiving an INFO with a duplicated IRQ=Complete and an EID=USID,TID when the IUT is in state U0S (IUT sent the SPID). [NI-1 8.5.3, 6.5.7]
NLU0IR_N006	Verify that the IUT does not respond after receiving an INFO with a duplicated IRQ=Complete and an EID=USID,TID when the IUT is in state U0IR (tester requested a SPID). [NI-1 8.5.3, 6.5.7]
NLU0S_N007	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete and a duplicated EID=USID,TID when the IUT is in state U0S (SPID sent). [NI-1 8.5.3, 6.5.7]
NLU0IR_N007	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete and a duplicated EID=USID,TID when the IUT is in state U0IR (test requested a SPID, SPID sent). [NI-1 8.5.3, 6.5.7]
NLU0S_N008	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete, EID=USID,TID and an unrecognized IE when the IUT is in state U0S (SPID sent). [NI-1 8.5.3, 6.5.3]
NLU0IR_N008	Verify that the IUT does not respond after receiving an INFO with IRQ=Complete, EID=USID,TID and an unrecognized IE when the IUT is in state U0IR (tester requested a SPID, SPID sent). [NI-1 8.5.3, 6.5.3]
Optional Terminal Initialization Test Cases	
NLU0S_V001	Verify that the IUT sends an INFO with SPI IE=SPID when the IUT is in state U0S (IUT sent the SPID). [NI-1 8.5.2] (Conditional on supporting T-SPID Timer)
NLU0IR_V001	Verify that the IUT sends an INFO with SPI=SPID when the IUT is in state U0IR (tester requested a SPID, SPID sent). [NI-1 8.5.3] (Conditional on supporting T-SPID Timer)
* Note: For NLxx_V18, the revised NIU.301 specifies response to STATUS ENQUIRY in all states. These STATUS ENQUIRY tests will be added to the next version of the NIU.301 test suites.	

Table 7. INFORMATION ELEMENTS - Specific to Messages
(Information for Testing)

Information Element	NIU.301	NI-1	Recommendation
ALERTING - User to Network			
Channel identification	Either preferred or exclusive B channel allowed	Exclusive B channel	For testing, use exclusive B channel.
User-user	Optional	Not supported	No impact to testing - this IE is allowed in both ATSs.
CALL PROCEEDING - User to Network			
Progress indicator	Supported	Not supported	For testing, recommend not sending Progress indicator.
CONNECT - User to Network			
User-user	Optional	Future	No impact on testing - allowed in both ATSs.
DISCONNECT - User to Network			
User-user	Optional	Future	Recommend not including this IE in user to network direction.
INFORMATION - User to Network			
Keypad facility	Mandatory	O.1*	Used for supplementary services in NI-1 - for basic call, recommend using Keypad facility, rather than Called Party Number.
Feature activation	Not supported	For supplementary services	No impact on testing - used for Supplementary Services.
Service Profile ID	Not supported	For initialization	See section 5.3.2 of this Guideline.
Called party number	Not supported	O.1*	Used for supplementary services in NI-1 - for basic call, recommend using keypad facility, rather than Called Party Number

Table 7. INFORMATION ELEMENTS - Specific to Messages (continued) (Information for Testing)			
Information Element	**NIU.301**	**NI-1**	**Recommendation**
INFORMATION - Network to User			
Progress indicator (PI)	Not supported	Allowed, but not required	IUT should be able to handle receipt of PI. For NIU.301, treat as an unrecognized non-mandatory IE and ignore PI, but process the information message.
RELEASE - User to Network			
User-user	Optional	Future	Recommend not including this IE in user to network direction
RELEASE COMPLETE - User to Network			
User-user	Optional	Future	Recommend not including this IE in user to network direction
SETUP - User to Network			
Channel identification	Either preferred or exclusive B channel allowed	Exclusive B channel allowed	For testing, use exclusive B channel
Feature activation	Not supported	For supplementary services	Not used for basic call - for supplementary services
User-user	Optional	Future	No impact on testing - allowed in both ATSs
Call appearance	Not supported	For supplementary services	Not used for basic call - for supplementary services
* O.1 = optional, but support of at least one of the group of options labeled O.1 is required			

Table 8. INFORMATION ELEMENTS - Specific to Coding			
Information Element	**NIU.301**	**NI-1**	**Comments**
Call reference	1 or 2 octets	1 octet	See section 5.1 of this Guideline.
Bearer capability octet 3: Information transfer capability	Restricted digital information allowed	Restricted digital information not allowed	For testing, choose a supported information transfer capability other than restricted digital information.
Bearer capability octet 5: User information Layer 1	G.722 and X.31 HDLC flag stuffing are allowed	G.722 and X.31 HDLC flag stuffing are not allowed	For testing, choose μ-law or rate adaption.
Called party number octet 3: Type of number	Network Specific Number is not allowed	Network Specific Number is allowed	For testing, use other than network specific number.
Calling party number octet 3: Type of number and Numbering Plan Identification	For user to network, local (subscriber), national and others are allowed.	For user to network, for type of number and numbering plan, either local or national and ISDN numbering plan is allowed.	For testing, for type of number and numbering plan, use local (subscriber) or national and ISDN numbering plan.
Cause octet 4: Cause value	Different values	Different values	See section 4.1 of this Guideline.
High layer compatibility octet 4a: Extended high-layer character-istics identification	Extended Higher Layer characteristics is not allowed	Extended Higher Layer characteristics is allowed	No impact on testing.
Low layer compatibility octet 3: Coding standard	Codepoint '01' not supported.	Supports codepoint '01' (other international standard)	No impact on testing.
Low layer compatibility octet 3: Information transfer capability	Video not allowed	Video allowed	No impact on testing.
Low layer compatibility octet 3a: Negotiation indicator	Out-band negotiation not allowed	Out-band negotiation allowed	No impact on testing.
Low layer compatibility octets 4 and 4b: Information transfer rate	Codepoint '10001' not supported	Supports codepoint '10001' (128 kbps)	No impact on testing.
	Supports codepoint '10100' (1472 kbps--national standard only)	Codepoint '10100' not supported	

Table 8. INFORMATION ELEMENTS – Specific to Coding (continued)

Information Element	NIU.301	NI-1	Comments
LLC-octets 4 and 4b:informa-tion transfer rate (cont.)	Codepoint '10111' not supported	Supports codepoint '10111' (1920 kbps)	No impact on testing.
Low layer compatibility octet 5: User information layer 1 protocol	Codepoint '00011' not supported	Supports codepoint '00011' (G.711 A-law)	No impact on testing.
	Codepoint '00100' not supported	Supports codepoint '00100' (G.721 32 kbps/ADPCM)	
	Codepoint '00110' not supported	Supports codepoint '00110' (H.261 for 384 kbps video)	
Low layer compatibility octet 5a: Synchronous/ asynchronous	Difference in content of note	Difference in content of note	No impact on testing.
Low layer compatibility octet 5b: In-band/ out of band negotiation	Codepoint '0' not supported	Supports codepoint '0' (negotiation done with user information messages)	No impact on testing.
Low layer compatibility octet 5c: Number of stop bits, number of data bits excluding parity, parity information	Usage note provided	No note present	No impact on testing.
Low layer compatibility octet 6: User information layer 2 protocol	Codepoint '01110' not supported	Supports codepoint '01110' (Q.922)	No impact on testing.
	Codepoint '01111' not supported	Supports codepoint '01111' (Q.922 core aspects)	
	Codepoint '10001' not supported	Supports codepoint '10001' (T.90)	
Low layer compatibility octet 7: User information layer 3 protocol	Codepoint '00010' not supported	Supports codepoint '00010' (Q.931)	No impact on testing.
	Codepoint '00101' not supported	Supports codepoint '00101' (T.90)	
Progress indicator octet 3: Location	General location international is not supported.	General location international is supported.	No impact on testing.
Signal octet 3: Signal value	Network Specific Signal value is not supported.	Network Specific Signal value is supported.	No impact on testing.

Table 9. OPTIONAL AND UNIQUELY SUPPORTED MESSAGES - User to Network (For Information - No Impact on Testing)			
Message	**NIU.301**	**NI-1**	**Comments**
HOLD	Not supported	Supported	No impact in ATS - for supplementary services
RETRIEVE	Not supported	Supported	No impact in ATS - for supplementary services
KEY SETUP	Not supported	Supported	No impact in ATS - for supplementary services
KEY RELEASE	Not supported	Supported	No impact in ATS - for supplementary services
KEY HOLD	Not supported	Supported	No impact in ATS - for supplementary services
HOLD REJECT	Not supported	Supported	No impact in ATS - for supplementary services
RETRIEVE REJECT	Not supported	Supported	No impact in ATS - for supplementary services
HOLD ACKNOWLEDGE	Not supported	Supported	No impact in ATS - for supplementary services
RETRIEVE ACKNOWLEDGE	Not supported	Supported	No impact in ATS - for supplementary services
KEY SETUP ACKNOWLEDGE	Not supported	Supported	No impact in ATS - for supplementary services
NOTIFY	Allowed-"may be ignored"	Not supported	No impact in ATS - Not tested

6 ABBREVIATIONS

ANSI	American National Standards Institute
ATS	Abstract Test Suite
BRI	Basic Rate Interface
COS	Corporation for Open Systems
CPE	Customer Premises Equipment
EID	Endpoint Identifier
ICOT	ISDN Conformance Testing Working Group
IE	Information Element
INFO	Information
IRQ	Information Request
ISDN	Integrated Services Digital Network
IUT	Implementation Under Test
kbps	kilobits per second
NI-1	National ISDN-1 (Bellcore CPE Guidelines)
NIUF	North American ISDN Users' Forum
PIXIT	Protocol Implementation Extra Information for Testing
SPID	Service Profile Identifier
SPI	Service Profile Identification
SS	Supplementary Services
USID	User Service Identifier
TID	Terminal Identifier
U1,U19	User states U1, U19

7 REFERENCES

[1] Bellcore SR-NWT-001953, *Generic Guidelines for ISDN Terminal Equipment on Basic Access Interfaces*, Issue 1, June 1991, plus revision 1, December 1991.

[2] NIU 90-301, *Implementation Agreement of the North American ISDN Users' Forum, Layer 3 Signalling Specification for the Minimal Set of Circuit Switched Bearer Services for the ISDN Basic Rate Interface/Class I*, 1990.

[3] National ISDN-1 BRI Basic Call Control Abstract Test Suite for user-side conformance testing, Corporation for Open Systems NI-1 Task Force (COS/ATS-93/001).

[4] North American ISDN Users's Forum NIUF 413-92, *Layer 3 Network Layer - Circuit Switch Call Control, Basic Rate Interface-Class I, User Side Abstract Test Suite (Version 1.2) June 1993.*

[5] NIUF 419-93, *Implementation Agreement of the North American ISDN Users' Forum, Addenda to NIU 301 (June 1993).*

[6] NIU 89-311, *Implementation Agreement of the North American ISDN Users' Forum, Generic Procedures for the Control of ISDN Supplementary Services - Basic Rate Interface/Class I.*

[7] ANSI T1.607-1990, *Telecommunications - Integrated Services Digital Network (ISDN) - Digital Subscriber Signalling System Number 1 (DSS1) - Layer 3 Signalling Specification for Circuit Switched Bearer Service.*

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a. ANSI Documents can be obtained by contacting the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

b. Bellcore Documents can be obtained by calling 1-800-521-CORE (2673) or by sending fax to (908) 336-2559.

c. COS Documents can be obtained by contacting Robert Blackshaw, COS, 8260 Willow Oaks Corporate Drive, Suite 700, Fairfax, VA 22031.

d. NIUF(NIU) Documents can be obtained by contacting: NIUF Administrator, NIST, Building 223, Room B-364, Gaithersburg, MD 20899.

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