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NICC Document

NGN Interconnect: PSTN Integration Testing Manual

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Contents

Intellectual Property Rights 4
Foreword 4
Introduction 4
1 Scope 5
2 References 6
2.1 Normative references 6
3 Abbreviations 7
4 Testing Requirements 8
4.1 Recommended Architecture 8
4.2 Reference Architecture 8
4.3 Testing Methodology 9
5 Tests 10
5.1 Signaling Association 11
5.2 Security 12
5.3 Media Path 13
5.4 QoS 14
5.5 SIP Headers and SDP 15
5.6 Echo Control 16
5.7 Calls 17
5.7.1 Simple Telephony 18
5.7.2 Onward Routing 20
5.7.3 Single Stage IDA 22
5.7.4 Carrier Pre-Select 25
5.7.5 Two Stage IDA 28
5.7.6 Number Translation Service 31
5.7.7 Malicious Call Intercept 34
5.7.8 Priority Call 35
5.7.9 Call Release / Failure Variants 36
5.7.10 Call Diversion 49
5.7.12 Calling Line Identity 54
5.7.13 Incomplete & Partial CLI 55
5.8 Call Simulations 58
5.9 Call Handling Stability 60
5.10 Restart Tests 61
5.11 Automatic Congestion Control 62
5.12 Packet Delay Variation (Jitter) 64
History 66

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Foreword

This NICC Document (ND) has been produced by the NICC TSG Testing Specifications Working Group.

Introduction

This document forms an Operational Testing Manual [OTM] template that can be used by CPs as a basis for part of the testing requirements when interconnecting their Next Generation Network [NGN] to another CPs NGN.

It is one of a series of documents (ND1410-14) which form a complete testing process for NGN PSTN interconnect.

1 Scope

It has been agreed in NICC that CPs must take a responsible approach to testing. This can be achieved by ensuring that CPs who want to interconnect to other CPs follow an appropriate process of testing before that interconnect is put into service.

It is recommended that testing should consist of the following stages:

- Validation (prior to any interconnection) - ND1413 [12] *
- Integration (of model networks) - ND1414 *

  * Appropriate when an unknown combination of equipment is to be connected

- Operational (of live routes) - ND1410 [1], ND1411 [2] and ND1412 [3]

This manual should be used at the “prior to interconnect” stage, before any operational testing takes place in order to ensure the proposed solution fulfils the fundamentals required for an interconnect service.

It contains the minimum testing elements needed to test the full functionality of an NGN interconnect between CPs and therefore should not be considered to be a complete set of tests that meet any one CPs full testing requirement. CPs may remove tests or include reasonable additional tests as appropriate provided they are agreed with the other interconnecting CP.

After completing this testing, CPs should proceed to operational testing as defined in ND1410-12 [1-3].

2 References

For the particular version of a document applicable to this release see ND1610 [6].

2.1 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1]	ND1410	NGN Interconnect: PSTN Transport OTM
[2]	ND1411	NGN Interconnect: PSTN Signalling OTM
[3]	ND1412	NGN Interconnect: PSTN Services OTM
[4]	ND1612	Generic IP Connectivity for PSTN/ISDN Service Between UK NGNs
[5]	ND1704	End-to-End Network Performance Rules & Objectives for the Interconnection of NGNs
[6]	ND1610	Next Generation Networks, Release Definition
[7]	ND1119	UK Interconnect use of Signalling for Packet-Based PSTN/ISDN
[8]	ND1017	Interworking between Session Initiation Protocol (SIP) and UK ISDN User Part (UK ISUP)
[9]	ND1625	NGN Interconnect: RTP Packet Transport Quality Monitoring
[10]	ND1635	NGN Interconnect: Securing Data Flows with IPSec
[11]	ND1628	NGN Interconnect: Media Path Technical Specification
[12]	ND1413	NGN Interconnect: PSTN Validation Testing Manual
[13]	ND1012	Interconnect Stream Control Transmission Protocol (SCTP) and Adaptation Layers
[14]	ND1423	Guidelines for Usage of Enbloc/Overlap Signalling in UK Networks

3 Abbreviations

ACM	Address Complete Message
ANM	Answer Message
B/W	Both Way
BGW	Border Gateway
CLI	Calling Line Identity
COLP	Connected Line Presentation
CP	Communication Provider
CPC	Calling Party Category
CPE	Customer Premises Equipment
CS	Call Server
CSA	Called Subscriber Answer
CSH	Called Subscriber Held
EET	Equipment Engaged Tone
GN	Generic Number
I/W	Interworking
IAM	Initial Address Message
ICMP	Internet Control Message Protocol
INT	International Indicator
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISUP	Integrated Services User Part
MBF	Media Border Function
MSIL	Multi Service Interconnect Link
NAS	Network Access Server
NGN	Next Generation Network
NICC	Network Interoperability Consultative Committee
NTAI	Network Translated Address Indicator
O/G	Outgoing
OSS	Operator Services Subsystem
OTM	Operational Test Manual
PN	Presentation Number
PSTN	Public Switch Telephony Network
REL	Release Message
RTCP	Real Time Control Protocol
RX	Receive
SBF	Signalling Border Function
SCTP	Stream Control Transmission Protocol
SFW	Signalling Firewall
SS7	Signalling System Number 7
T/O	Time Out
TX	Transmit
UK-ISUP	UK version of ISUP
VLAN	Virtual Local Area Network

4 Testing Requirements

4.1 Recommended Architecture

The recommended architecture on which to perform testing defined within this manual is shown below in Figure 1.

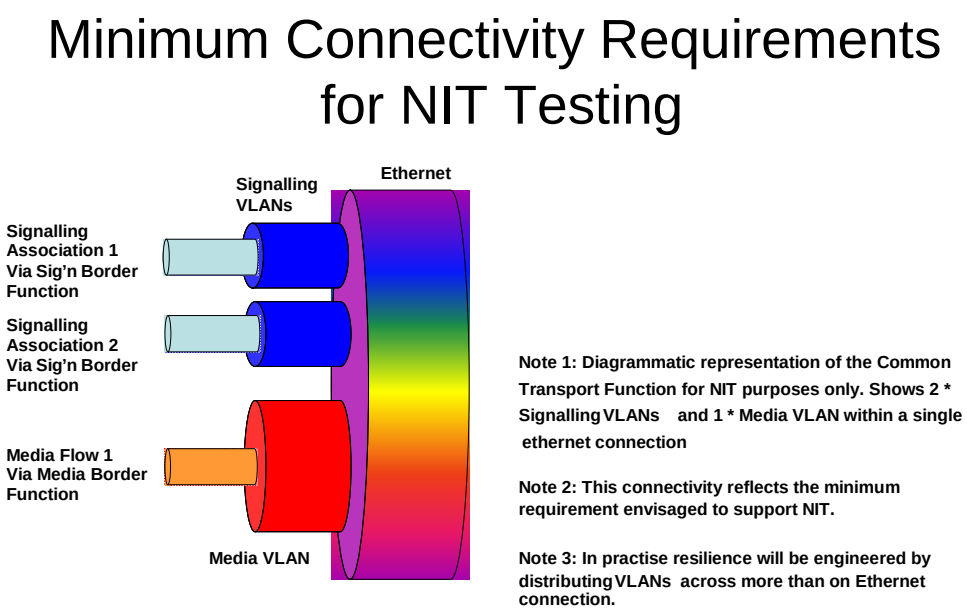

Figure 1 - Recommended Minimum Architecture for Testing

4.2 Reference Architecture

Within this document, reference is made to functions and interfaces. These functions and interfaces are described in detail in ND1612 [4]. Reference should be made to "Figure 1: Functional Architecture for PSTN / ISDN Generic Connectivity".

Where a different architecture is used, test procedure should be adapted as appropriate.

4.3 Testing Methodology

All tests should be completed and passed.

Test results sheets should be retained locally in line with normal document retention guidance.

Where any test does not produce acceptable responses, the reasons should be investigated, a remedy attempted and the test repeated. The number of times the test is repeated and reasons why should be noted in results. Where appropriate, escalation procedures to the relevant support groups and commercial teams should be pursued.

If an immediate resolution can not be found, a time limited waiver should be agreed between the parties to allow the testing to continue, and the testing to move onto the “Operational” phase (provided that the issue is not service affecting).

All tests should be verified against NICC specifications in force at the time of testing, which may differ from those stated in the following tests. In such cases the test procedure should be adjusted as necessary (and recorded against the test in the result sheet) whilst still maintaining the integrity of the test.

If there is functionality which is not supported by either or both parties in the interconnect agreement (e.g. where an older version of standards is to be implemented), certain parts of this testing may not be able to be completed; where this is the case the reason should be recorded against the test in the result sheet.

This manual contains a sign off sheet, in Annex A, which should be completed by a CP before any interconnection to another CPs NGN. This completed sheet, along with appropriate test result documentation should be handed to the interconnecting CP before the commencement of any joint testing activity.

5 Tests

All of the following tests should be completed in full, provided that the particular service type or functionality is to be used on the interconnect service being tested.

Call Duration Records [CDRs] must be exchanged on all service types for calls marked “CDR”.

5.1 Signaling Association

Requirement	To Verify Correct Operation Of The SCTP Association in Accordance with ND1012 [13] and ND1119 [7]

A	**Successful establishment of the SCTP association**	**Reference**
That the appropriate IP connectivity between CPs exists. This will include IPSec tunnels and any related information must have been configured and verified as working		See ND1413 [12] Section 5.2

B	**Path Failure & Recovery In a Multi-Homed Association**	**Reference**
Correct failure & recovery of one/both paths of a multi-homed association		See ND1413 [12] Section 5.2

C	**SCTP association shutdown and start-up procedures**	**Reference**
To verify appropriate SCTP association shutdown and start-up procedures		See ND1413 [12] Section 5.2

D	**Effect of SCTP failures on call set-up and calls in progress**	**Reference**
Effect of SCTP failure on call set-up and call in progress		See ND1413 [12] Section 5.2

E	**SCTP Performance**	**Reference**
Check the quality of the signalling through SCTP statistics on packet loss and retransmission counts		See ND1411 [2] Test SIG 08

5.2 Security

Requirement	To Verify the Security Aspects of the Interconnect as specified in ND1635 [10]

A	**Signalling Security**	**Reference**
Authentication, encryption and data integrity - IPSec tunnel set and monitoring the IPSec protocol at the signalling control function for correct function		See ND1413 [12] Section 5.1

B	**General Security**	**Reference**
• Resilience to Denial of Service attacks - o Request Flooding o Malformed Requests and Messages o QoS abuse o Spoofing o Call Hijacking • Resilience to Resource consuming attacks		

C	**Denial to CP Public Addresses and other Non uktel.org.uk Sources**	**Reference**
Ensure call failure from non-PSTN/ISDN carrier sources using the - cs.cp.uktel.org.uk addressing format.		

5.3 Media Path

Requirement	To Verify the Appropriate Operation of the Media Path as per ND1425 [9] and ND1628 [11]

A	**IP Path Connectivity and Alarming**	**Reference**
To verify the IP path to ensure BGW connectivity, typically checking for end to end packet delivery, send and receive checks, trail connectivity tests and disconnect alarm tests		See ND1413 [12] Section 5.3

B	**Resilience of the media stream**	**Reference**
To verify the resilience of the media stream		See ND1413 [12] Section 5.3

C	**Bandwidth Management Function**	**Reference**
Verify Bandwidth Management Functionality – to limit the number of simultaneous calls		See ND1413 [12] Section 5.3

5.4 QoS

Requirement	To Verify Appropriate Quality of Service Levels on the Media Path as per ND1704 [5] and ND1625 [9]

A	**End To End Delay**	**Reference**
Confirm that End To End delay is suitably monitored and falls within the acceptable range		See ND1413 [12] Section 5.4

B	**Packet Delay Variation & Loss**	**Reference**
Confirm that Packet Delay Variation & Packet Loss are suitably monitored and fall within the acceptable range		See ND1413 [12] Section 5.4

C	**End To End Voice Quality**	**Reference**
Confirm that end to end voice quality meets appropriate MOS levels for class 4/5 networks using PESQ statistical analysis. Currently, there is no agreed UK standard for measuring voice quality. Therefore, until such a standard is agreed, this test should only be performed between CPs which have a bilateral agreement to actively measure and manage call quality.		See ND1413 [12] Section 5.4

5.5 SIP Headers and SDP

Requirement	To Verify that the Appropriate Information is Provided in the SIP Invite as per ND1017 [8] and ND1612 [4]

A	**SIP Headers**	**Reference**
To ensure that the correct version of SIP (v2.0) is used, and confirm; the correct address format, for SCTP, the correct Max Fwds, the correct P Charging Vector, for SIP(I) profile C		See ND1411 [2] Test SIG 05

B	**SDP**	**Reference**
To confirm the correct codec and packetisation rate for PSTN and ISDN calls		See ND1411 [2] Test SIG 06

5.6 Echo Control

Requirement	To Verify that the Appropriate Information is Provided in the SIP Invite as per ND1017 [8]

A	**Encapsulated ISUP Echo Control**	**Reference**
To confirm the correct setting and function of the Echo Control flags		See ND1411 [2] Test SIG 07

5.7 Calls

5.7.1 Simple Telephony

Requirement	To ensure that a call can be successfully set up between the originating and terminating line types as defined in the following tables and that the CLI status as defined in the IAM by the CBI in the National Forward Calls parameter and Address Presentation Restriction setting in the Calling party Number and Presentation Number parameters is conformed to by the terminating CPE as per ND1017 [8]

A	**En-Bloc Signalling**	**Reference**
Make a call from the originating line type to the terminating line type. Answer the call and ensure that communication occurs between the two end users. N.B. DEL can also be a MOB for mobile networks.		See ND1423 [14]
The following checks should be made for each of the following calls		
1	All parameter values in the IAM are correctly set for the call type	
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings	
3	Where a requested bearer cap is not supported by the receiving N/W or CPE, note whether an in-band tone/announcement is applied and confirm appropriate Release cause and location.	
4	Ensure parameters in the ACM, ANM, CON are appropriate to call type	

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR	
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

B	Overlap Signalling	Reference
Make a call from the originating line type to the terminating line type. Answer the call and ensure that a speech path exists between the two phones. N.B. DEL can also be a MOB for mobile networks.		See ND1423 [14]

The following checks should be made for each of the following calls

1	Ensure all required parameter types and values in the IAM, CON, ACM, ANM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
3	Where a requested bearer cap is not supported by the receiving N/W or CPE, note whether an in-band tone/announcement is applied and confirm appropriate Release cause and location.
4	Ensure parameters in the ACM, ANM, CON are appropriate to call type
5	Detailed checks for correct call behaviour under overlap scenarios, including incomplete number lengths, early call abandonment, different number length in IAMs and SAMs, priority calls and CLI variants.

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	R		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	R		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

5.7.2 Onward Routing

Requirement	To ensure that successful and abandoned calls correctly interface with IUP / UK-ISUP TDM and other NGN networks as per ND1017 [8] and ND1423 [14]. Calls routed NGN to NGN then to TDM network. In all successful call cases verify that the call is set up correctly and that any intervening Invites are rejected with 'address incomplete'. Where there are insufficient digits to complete the call, verify that all call resources are released appropriately

A	**Overlap Call Set-Up Without Immediate Onward Routing to TDM**					**Reference**
Overlap signalling without immediate onward delivery where the receiving NGN does not forward on the call to the TDM network until the full destination number digits have been received						See ND1423 [14]
The following checks should be made for each of the following calls						
1	SIP-I Invite (IAM) contains partial address; remaining digits received en-bloc					
2	SIP-I Invite (IAM) contains partial address; remaining digits received individually					
3	SIP-I Invite (IAM) contains partial address; caller abandons before end of digits (may require examination of Call Server internal data, if possible)					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	ISDN	ISDN	64kbit	P		
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	*DEL*	*DEL*		*P*		
2	*ISDN*	*ISDN*	*64kbit*	*P*		

B	Overlap Signalling With Immediate Onward Routing to TDM	Reference
Overlap signalling with immediate onward delivery where the receiving NGN forwards on the call to the TDM network before the full destination number digits have been received		See ND1423 [14]

The following checks should be made for each of the following calls	
1	SIP-I Invite (IAM) contains partial address; outgoing IUP/UK-ISUP circuit seized; Invite with subsequent digits; subsequent digits received en-bloc
2	SIP-I Invite (IAM) contains partial address; outgoing IUP/UK-ISUP circuit seized; subsequent digits received in individual Invites
3	SIP-I Invite (IAM) contains partial address; outgoing IUP/UK-ISUP circuit seized; caller abandon

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	ISDN	ISDN	64kbit	P		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	*DEL*	*DEL*		*P*		
2	*ISDN*	*ISDN*	*64kbit*	*P*		

C	Overlap Signalling With Onward Delivery To NGN	Reference
In these call cases the receiving node routes the call onwards to a SIP-I route. Arrange that the SIP-I invite is returned across the NGN interconnect to the sending Call Server, and is terminated there		See ND1423 [14]

The following checks should be made for each of the following calls	
1	SIP-I Invite (IAM) contains partial address; outgoing SIP-I invite sent; subsequent digits received en-bloc
2	SIP-I Invite (IAM) contains partial address; outgoing SIP-I invite sent; subsequent digits received individually
3	SIP-I Invite (IAM) contains partial address; outgoing SIP-I invite sent; caller abandon

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		*P*		
2	ISDN	ISDN	64kbit	*P*		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	*DEL*	*DEL*		*P*		
2	*ISDN*	*ISDN*	*64kbit*	*P*		

5.7.3 Single Stage IDA

Requirement	To ensure that Indirect Access Single Stage (IDA1) calls work appropriately as per ND1017 [8]

A	**Registered CLI**					**Reference**
CP1 via IDA1 to CP2						ND1017 [8]
The following checks should be made for each of the following calls						
1	All parameter values in the IAM are correctly set for the call type					
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR	
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

B	Registered CLI With Transit	Reference
CP1 via IDA1 to CP2 back to CP1 OR CP1 via IDA1 to CP2 back to CP1		ND1017 [8]

The following checks should be made for each of the following calls	
1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
3	For transit calls, confirm that the “B” leg parameter values are as “A” leg (except Called Party Address parameters) and that the “B” leg Called Party address and NAI are set for ‘National’

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

C	Unregistered CLI	Reference
CP1 via IDA1 to CP2		ND1017 [8]

The following checks should be made for each of the following calls	
1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
4	Confirm the call is rejected with an appropriate tone/announcement followed by Release (31)

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	ISDN	ISDN	64kbit	P		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	ISDN	ISDN	64kbit	P		

5.7.4 Carrier Pre-Select

Requirement	To ensure that Carrier Pre-Select (CPS) calls work appropriately as per ND1017 [8]

A	**Without Transit**	**Reference**
CP1 via CPS to CP2		ND1017 [8]

The following checks should be made for each of the following calls

1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR	
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

B	With Transit	Reference
CP1 via CPS to CP2 back to CP1		ND1017 [8]

The following checks should be made for each of the following calls

1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
3	Confirm that the "B" leg parameter values are as "A" leg (except Called Party Address parameters) and that the "B" leg Called Party address and NAI are set for 'National'

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1> CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

C	LDLI	Reference
CP1 via CPS to CP2 Busy, Diverted back to CP1		ND1017 [8]

The following checks should be made for each of the following calls	
1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
3	Confirm that the “C” leg parameter values are as “A” leg (except Called Party Address parameters) and that the “C” leg Called Party address and NAI are set for ‘National’
3	Confirm that the CTI value in the diverting IFAM is set to a value of 1 (diverted call) and the LDLI (ACI interchange with ICC & IRC = 11) is correct

CP1 > CP2 Divert CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR	
2	ISDN	ISDN	64kbit	R		

CP2 > CP1 Divert CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR	
2	ISDN	ISDN	64kbit	R		

5.7.5 Two Stage IDA

Requirement	To ensure that Indirect Access Two Stage (IDA2) calls work appropriately as per ND1017 [8]

A	**Without Transit**					**Reference**
The caller is prompted to enter authentication information which is sent as in-band tones. The prompt may be after sending the IDA code or after IDA + destination address and will be dependent on the CP service offered CP1 via IDA2 to CP2						ND1017 [8]
The following checks should be made for each of the following calls						
1	All parameter values in the IAM are correctly set for the call type					
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR	
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

B	With Transit	Reference
CP1 via IDA2 to CP2 back to CP1		ND1017 [8]

The following checks should be made for each of the following calls	
1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
3	Confirm that the “B” leg parameter values are as “A” leg (except Called Party Address parameters) and that the “B” leg Called Party address and NAI are set for ‘National’

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1> CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

C	Invalid Authorisation	Reference
Enter an invalid authorisation code CP1 via IDA1 to CP2		ND1017 [8]

The following checks should be made for each of the following calls	
1	All parameter values in the IAM are correctly set for the call type
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
4	Confirm the call is rejected with an appropriate tone/announcement followed by Release (31)

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	ISDN	ISDN	64kbit	P		

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	ISDN	ISDN	64kbit	P		

5.7.6 Number Translation Service

Requirement	To ensure that Number Translation Service (NTS) calls work appropriately as per ND1017 [8]

A	**Enbloc Signaling Non Transit**					**Reference**
Translation and termination in range holder's network						ND1017 [8]
The following checks should be made for each of the following calls						
1	All parameter values in the IAM are correctly set for the call type					
2	Confirm that the "B" leg parameter values are as "A" leg (except Called Party Address parameters) and that "B" leg Called Party address and NAI are set for National					
3	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings					
4	Calls are marked as **chargeable** (to the caller)					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR [Repeat for both chargeable and non-chargeable to end user NTS types]	
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

B	Enbloc Signaling Transit	Reference
Translation in range holder's network and termination in the originating network		ND1017 [8]

The following checks should be made for each of the following calls	
1	All parameter values in the IAM are correctly set for the call type
2	Confirm that the "B" leg parameter values are as "A" leg (except Called Party Address parameters) and that "B" leg Called Party address and NAI are set for National
3	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
4	Calls are marked as **chargeable** (to the caller)

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P	CDR [Repeat for both chargeable and non-chargeable to end user NTS types]	
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

CP2 > CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		
2	DEL	DEL		R		
3	DEL	DEL		U		
4	ISDN	ISDN	Speech	P		
5	ISDN	ISDN	Speech	R		
6	ISDN	ISDN	Speech	U		
7	ISDN	ISDN	3.1kHz	P		
8	ISDN	ISDN	64kbit	R		
9	ISDN	ISDN	9.6kbit	R		

C	Transit With Presentation Number	Reference
Translation in range holder's network and termination in the originating network with UPVP presentation number included		ND1017 [8]

The following checks should be made for each of the following calls	
1	The IAM contains Calling Party number, Presentation Number and Generic number parameters and other appropriate parameters
2	Confirm that the "B" leg parameter values are as "A" leg (except Called Party Address parameters) and that "B" leg Called Party address and NAI are set for National
3	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings
4	Calls are marked as **chargeable** (to the caller)

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*PN*	*Comments*	*Result*
1	DEL	DEL		P	P		
2	DEL	DEL		P	R		
4	ISDN	ISDN	Speech	P	P		
5	ISDN	ISDN	Speech	R	R		

CP2 > CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*PN*	*Comments*	*Result*
1	DEL	DEL		P	P		
2	DEL	DEL		P	R		
4	ISDN	ISDN	Speech	P	P		
5	ISDN	ISDN	Speech	R	R		

5.7.7 Malicious Call Intercept

Requirement	To ensure that Malicious Call Intercept (MCI) facility works appropriately as per ND1017 [8]

A	**Malicious Call Intercept**					**Reference**
Malicious Call Intercept (or equivalent) provided on terminating line call agent equipment						ND1017 [8]
The following checks should be made for each of the following calls						
1	All parameter values in the IAM are correctly set for the call type					
2	CLI display at the terminating CPE conforms to the CBI and Address presentation restriction indicator settings					
3	A printout (or retrievable record) of the calling party number can be obtained from the MCI trace function at the terminating switch					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	ISDN		P		
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	3.1kHz	P		
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	DEL	Speech	P		
2	DEL	DEL		P		
3	DEL	ISDN	3.1kHz	P		

5.7.8 Priority Call

Requirement	To ensure that priority call markings are appropriately tagged to Emergency and other priority calls as per ND1017 [8]

A	**Priority Call**					**Reference**
A priority call e.g. 999 112						ND1017 [8]
The following checks should be made for each of the following calls						
1	All parameter values in the IAM CON, ACM, ANM are correctly set for the call type					
2	Confirm that identifier (ii) and zone code (mobile only) are correctly appended to the called address as appropriate					
3	That the CLI and any service marks are passed					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	OSS		P		
1	ISDN	OSS	Speech	P		
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	3.1kHz	P		
CP1 > CP2 > CP1 [IDA1, IDA2]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL		P		

5.7.9 Call Release / Failure Variants

Requirement	To ensure that calls terminate appropriately as per ND1017 [8]

A	**Forward Release Prior to Address Complete (Cause 16 - Normal)**					**Reference**
Originate a call from the specified line and hang up before the address complete is received (on 'A' leg if appropriate)						ND1017 [8]
The following checks should be made for each of the following calls						
1	That the cause and location of the REL origin is appropriate					
2	That the destination responds with an RLC and call is fully released					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

B	Forward Release Prior to Answer (Cause 16 - Normal)					Reference
Originate a call from the specified line and hang up before the 'answer' is received (on 'B' leg if appropriate)						ND1017 [8]
The following checks should be made for each of the following calls						
1	That the cause and location of the REL origin is appropriate					
2	That the destination responds with an RLC and call is fully released					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

C	Forward Release After Answer (Cause 16 - Normal)	Reference
Originate a call from the specified line and hang up after the 'answer' is received		ND1017 [8]

The following checks should be made for each of the following calls

1	That the cause and location of the REL origin is appropriate
2	That the destination responds with an RLC and call is fully released

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

D	Backward Release After Answer (Cause 16 - Normal)	Reference
Originate a call from the specified line and hang up after the 'answer' is received		ND1017 [8]

The following checks should be made for each of the following calls

1	That the cause and location of the REL origin is appropriate
2	That the destination responds with an RLC and call is fully released

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

E	Suspend / Resume & Timeout (Cause 16 - Normal)	Reference
Originate a call from the specified line and answer it. Hang up the called party, wait 10 seconds then re-answer. Finally hang up the called party again and wait until the call subscriber held timer expires before clearing the calling party		ND1017 [8]
The following checks should be made for each of the following calls		
1	The transmission path is re-established on re-answer	
2	The REL cause and location on expiry of the CSH timer	

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

F	Ringing Tone No Reply - CSA Time-out (Cause 19 - No Answer)	Reference
Originate a call from the specified line and leave it ringing until the CSA time-out expires		ND1017 [8]

The following checks should be made for each of the following calls

1	The REL cause and location on expiry of the CSA timer
2	Where the REL originated and time after ACM

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

G	Calls to TOOS Lines (Cause 27 - Destination Out of Order)	Reference
Set the destination line as Temporarily Out of Order and originate a call from the specified line		ND1017 [8]

The following checks should be made for each of the following calls

1	The REL cause and location

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

H	Calls to Spare Numbers (Cause 1 - Unallocated Number)	Reference
Set the destination line as ‘Spare’ and originate a call from the specified line		ND1017 [8]

The following checks should be made for each of the following calls

1	The REL cause and location

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

I	Calls to Busy Numbers (Cause 17 - User Busy)	Reference
Make the destination line busy (by making another call) and originate a call from the specified line		ND1017 [8]

The following checks should be made for each of the following calls

1	The REL cause and location

CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 > CP1 [IDA1, IDA2, NTS]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

J		Incomplete Dialling (Cause 28 - Address Incomplete)				Reference
Using overlap signalling, originate a call from the specified line but do not dial the last destination digit						ND1017 [8]
The following checks should be made for each of the following calls						
1	The REL cause and location					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

K	No Terminating Equipment (Cause 18 - No User Response)					Reference
Originate a call from the specified line						ND1017 [8]
The following checks should be made for each of the following calls						
1	The REL cause and location					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

L	Incompatible Destination (Cause 88 - Incompatible Destination)					Reference
Originate a call from the specified line						ND1017 [8]
The following checks should be made for each of the following calls						
1	The REL cause and location					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	DEL	64kbit			
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	DEL	64kbit			
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	DEL	64kbit			

M	Incoming Calls Barred Cause 31 (Normal Unspecified)					Reference
Set the destination line so that incoming calls are barred and originate a call from the specified line						ND1017 [8]
The following checks should be made for each of the following calls						
1	The REL cause and location					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

5.7.10 Call Diversion

Requirement	To confirm that Call Diversion works appropriately as per ND1017 [8]

A	**Unconditional Diversion**					**Reference**
Originate a call from the specified line with immediate diversion back to the originating network						ND1017 [8]
The following checks should be made for each of the following calls						
1	Confirm that the 'B' leg originating CLI parameter values are the same as the A leg values					
2	The diverting node CLI has been added in both the Redirecting Number and LDLI parameters					
CP1 > CP2 diverted back to CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1 diverted back to CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 diverted back to CP1 [IDA1, IDA2]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

B	Divert on No Reply					Reference
Originate a call from the specified line with diversion back to the originating network after the no answer timer has run						ND1017 [8]
The following checks should be made for each of the following calls						
1	Confirm that the 'B' leg originating CLI parameter values are the same as the A leg values					
2	The diverting node CLI has been added in both the Redirecting Number and LDLI parameters					
CP1 > CP2 diverted back to CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP2 > CP1 diverted back to CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				
CP1 > CP2 diverted back to CP1 [IDA1, IDA2]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

C	Divert on Busy	Reference
Originate a call from the specified line to a busy number with diversion back to the originating network		ND1017 [8]

The following checks should be made for each of the following calls	
1	Confirm that the 'B' leg originating CLI parameter values are the same as the A leg values
2	The diverting node CLI has been added in both the Redirecting Number and LDLI parameters

CP1 > CP2 diverted back to CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP2 > CP1 diverted back to CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

CP1 > CP2 diverted back to CP1 [IDA1, IDA2]

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	Speech			
2	DEL	DEL				

D	Divert on Unreachable Mobile	Reference
Originate a call from the specified line to an unreachable mobile with diversion back to the originating network		ND1017 [8]

The following checks should be made for each of the following calls	
1	Confirm that the 'B' leg originating CLI parameter values are the same as the A leg values
2	The diverting node CLI has been added in both the Redirecting Number and LDLI parameters

CP1 > CP2 diverted back to CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	MOB				

CP2 > CP1 diverted back to CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	MOB				

5.7.11 Teleservices

Requirement	To confirm appropriate operation of ISDN Teleservices as per ND1017 [8]

A	**ISDN Teleservices**				**Reference**
Originate a call from the specified line with the appropriate service selected on the NTE / Tester					ND1017 [8]
The following checks should be made for each of the following calls					
1	Confirm that the receiving NTE / Tester responds correctly				
2	Confirm that the appropriate signalling messages are exchanged				
CP1 > CP2					
	Orig. Line	*Term. Line*	*Service*	*Response*	*Result*
1	ISDN	ISDN	Telefax Group 2/3		
2	ISDN	ISDN	Telefax Group 4		
3	ISDN	ISDN	Mixed Mode		
4	ISDN	ISDN	Teletex (Basic mode)		
5	ISDN	ISDN	International Videotex		
6	ISDN	ISDN	3G Video		
7	ISDN	ISDN	Telex		
CP2 > CP1					
	Orig. Line	*Term. Line*	*Service*	*Response*	*Result*
1	ISDN	ISDN	Telefax Group 2/3		
2	ISDN	ISDN	Telefax Group 4		
3	ISDN	ISDN	Mixed Mode		
4	ISDN	ISDN	Teletex (Basic mode)		
5	ISDN	ISDN	International Videotex		
6	ISDN	ISDN	3G Video		
7	ISDN	ISDN	Telex		

5.7.12 Calling Line Identity

Requirement	To ensure that Calling Line Identity is transited correctly (using the appropriate formats, signaling and conventions) as per ND1017 [8] and the Ofcom CLI Code of Practice

A	**CLIP CLIR COLP COLR**					**Reference**
Set up calls using the combinations of CLIP, CLIR, COLP, and COLR shown						ND1017 [8] Ofcom CLI Code of Practice
The following checks should be made for each of the following calls						
1	Confirm whether the CLI and TLI are displayed in each case as indicated					
CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	3.1kHz	See Table Below		
2	ISDN	ISDN	3.1kHz			
3	ISDN	ISDN	Speech			
4	ISDN	ISDN	Speech			
CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	3.1kHz	See Table Below		
2	ISDN	ISDN	3.1kHz			
3	ISDN	ISDN	Speech			
4	ISDN	ISDN	Speech			
CP1 > CP2 > CP1 [IDA1, IDA2, NTS]						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	ISDN	ISDN	3.1kHz	See Table Below		
2	ISDN	ISDN	3.1kHz			
3	ISDN	ISDN	Speech			
4	ISDN	ISDN	Speech			

Originating Line				***Terminating Line***				*Terminating line ID shown on caller's display?*	*Caller's line ID shown at called party's display?*
CLIP	CLIR	COLP (TLID)	COLR	CLIP	CLIR	COLP (TLID)	COLR		
1	OFF	ON		ON			ON	NO	YES
2	OFF	ON		OFF			OFF	YES	NO
3	ON	ON		ON			OFF	YES	NO
4	ON	ON		OFF			ON	NO	NO

5.7.13 Incomplete & Partial CLI

A	Incomplete CLI - Interworking and International Indicators NOT Set	**Reference**
Check appropriate response for incomplete CLI where Interworking and International Indicators are NOT set		ND1017 [8] Ofcom CLI Code of Practice

The following checks should be made for each of the following calls	
1	Confirm that the correct partial CLI is being used and works appropriately
2	Confirm the correct response to partial CLI

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

CP2 > CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

B	Partial CLI - Interworking and International Indicators NOT Set	**Reference**
Check appropriate use and response for Partial CLI where Interworking and International Indicators are NOT set		ND1017 [8] Ofcom CLI Code of Practice

The following checks should be made for each of the following calls	
1	Confirm that the correct partial CLI is being used and works appropriately
2	Confirm the correct response to partial CLI

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

CP2 > CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

C	Partial CLI - Interworking and International Indicators Set					**Reference**
Check appropriate use and response for Partial CLI where Interworking and International Indicators are set						ND1017 [8] Ofcom CLI Code of Practice
The following checks should be made for each of the following calls						
1	Confirm that the correct partial CLI is being used and works appropriately					
2	Confirm the correct response to partial CLI					
CP1 > CP2 > CP1						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			
CP2 > CP1 > CP2						
	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

D	Partial CLI - Mixed Interworking and International Indicators Settings	**Reference**
Check appropriate use and response for Partial CLI where Interworking Indicator is set but the International Indicator is NOT set		ND1017 [8] Ofcom CLI Code of Practice
The following checks should be made for each of the following calls		
1	Confirm that the correct partial CLI is being used and works appropriately	
2	Confirm the correct response to partial CLI	

CP1 > CP2 > CP1

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

CP2 > CP1 > CP2

	Orig. Line	*Term. Line*	*Bearer Cap.*	*CLI*	*Comments*	*Result*
1	DEL	DEL				
2	DEL	ISDN	Speech			

5.8 Call Simulations

Requirement	To ensure that calls involving valid and invalid CPC and TMR parameter values and combinations of values are appropriately dealt with as per ND1017 [8]

A	**Response To TMR Values**			**Reference**
Make simulated calls as specified				ND1017 [8]
The following checks should be made for each of the following calls				
1	Confirm message sequence appropriate for acceptance or rejection			
CP1 > CP2 > CP1				
	Type	*TMR*	*Comments*	*Result*
1	ISDN Speech	0		
3	ISDN 64kHz	2		
4	ISDN 3.1kHz	3		
CP2 > CP1 > CP2				
	CPI / SHP Combination	*TMR*	*Comments*	*Result*
1	ISDN Speech	*0*		
3	ISDN 64kHz	*2*		
4	ISDN 3.1kHz	*3*		

B	Response To CPC Values	Reference
Make simulated calls as specified		ND1017 [8]

The following checks should be made for each of the following calls

1	Confirm message sequence appropriate for acceptance or rejection

CP1 > CP2 > CP1

	Type	*Value*	*Comments*	*Result*
1	Ordinary	10		
2	Public payphone	15		
3	Admin diverted	254		
4	Operator call	252		
5	Other Language (Not Set)	39		

CP2 > CP1> CP2

	Type	*Value*	*Comments*	*Result*
1	Ordinary	10		
2	Public payphone	15		
3	Admin diverted	254		
4	Operator call	252		
5	Other Language (Not Set)	39		

5.9 Call Handling Stability

Requirement	To ensure that equipment solutions can cope with significant calls volumes over long periods

A	**Call Stability**	**Reference**
CPs should agree and perform a set of call handling routines (with agreed success rates) and document the findings in the table below. An appropriate call profile mix should be used (relating to the call types expected on the interconnection)		ND1017 [8]
The following checks should be made for each of the following routines		
1	Confirm appropriate call routine success rates	

Routine	***Summary of Routine***	***Duration***	***Total Calls***	***Calls Failed***	***Success Rate***	***Results***

5.10 Restart Tests

Requirement	To confirm that the status of the restarting switch is correctly transferred via SIP-I messaging as per ND1017 [8]

A	**Small Restart**	**Reference**
Call to be set up in each direction, circuits blocked from each end, some before Timer expiry (3 mins), some after Timer expiry		ND1017 [8]
The following checks should be made for each of the following calls		
1	Confirm that calls survive the restart and that the circuits are in correct states after the restart	
	Comments	*Result*
CP1		
CP2		

B	**Large Restart**	**Reference**
Call to be set up in each direction, circuits blocked from each end, some before Timer expiry (3 mins), some after Timer expiry		ND1017 [8]
The following checks should be made for each of the following calls		
1	Confirm that calls do not survive the restart and that the circuits are in correct states after the restart	
	Comments	*Result*
CP1		
CP2		

5.11 Automatic Congestion Control

Requirement	To confirm, using a protocol simulator the correct operation of ACC as per ND1017 [8]

A	**Congestion Response**		**Reference**
Make two connections from the equipment to the protocol simulator. On connection A, send IAMs (from simulator to equipment) which are then transited back to the simulator (through the equipment) via connection B. Simulator then returns congestion on B by responding with REL42s (location=transit) and with ACL parameter set as specified below			ND1017 [8]
The following checks should be made for each of the following calls			
1	Confirm that the equipment responds with a RLCs on the B connection and RELs on the A connection (without the ACL element)		
Congestion Routines		*Comments*	*Result*
1	2 minute run with ACL value=1 and some 999 calls		
2	2 minute run with ACL value=2 and some 999 calls		

B	Congestion Performance	Reference
Make two connections from the equipment to the protocol simulator as described in the previous test. Generate a steady stream of calls to the equipment - including some emergency calls if appropriate and then also inject the following congestion routine		ND1017 [8]
The following checks should be made for each of the following calls		
1	During the uncongested portions of the routines confirm that all messages are again successfully transited by the equipment (IAMs, ACMs and ANMs)	
2	During the congested portions of the routines confirm that the number of IAMs passed to the B simulator is less than the number of IAMs passed from the A simulator (Note: It may be necessary to reduce the CP switch ACC threshold)	
3	Confirm that the equipment responds with a RLCs on the B connection and RELs on the A connection (without the ACL element)	
4	Confirm that **ALL** emergency calls are passed	

	Congestion Routine	*Comments*	*Result*
1	1min normal calls, 8mins of 10%, 1%, 2%, 5% ACL1's and 3mins calls without ACL's		
2	1min normal calls, 8mins of 20% ACL1's and 3mins calls without ACL's		
3	1min normal calls, 8mins of 30% ACL1's and 3mins calls without ACL's		
4	1min normal calls, 8mins of 10%/1%/2%/5% ACL2's and 3mins calls without ACL's		
5	1min normal calls, 8mins of 20% ACL2's and 3mins calls without ACL's		

5.12 Packet Delay Variation (Jitter)

Requirement	To confirm that the status of the restarting switch is correctly transferred via SIP-I messaging as per ND1704 [5]

A	**PDV NGN Only**		**Reference**
From end user on CP1 NGN, through NGN interconnect, to end user on CP2 NGN with calls being made in both directions			ND1704 [5]
The following checks should be made for each of the following calls			
1	Measure voice quality and end to end delay during to confirm correct adaptive jitter buffer operation		
2	Measure voice quality and end to end delay before and after application of 2100Hz tone, to confirm correct fixed jitter buffer operation		
PDV Routine		*Comments*	*Result*
1	Stepped increases in applied jitter as defined in ND1704		
2	Application of 2100Hz tone		

B	**PDV Terminating On TDM**		**Reference**
From end user on CP1 NGN, through NGN interconnect, via CP2 NGN and CP2 TDM gateway into end user on CP2 TDM with calls being made in both directions			ND1704 [5]
The following checks should be made for each of the following calls			
1	Measure voice quality and end to end delay during to confirm correct adaptive jitter buffer operation		
2	Measure voice quality and end to end delay before and after application of 2100Hz tone, to confirm correct fixed jitter buffer operation		
PDV Routine		*Comments*	*Result*
1	Stepped increases in applied jitter as defined in ND1704		
2	Application of 2100Hz tone		

C	PDV Originating On TDM	Reference
From end user on CP1 TDM, via CP1 TDM gateway and NGN, through NGN interconnect, to end user on CP2 NGN with calls being made in both directions		ND1704 [5]
The following checks should be made for each of the following calls		
1	Measure voice quality and end to end delay during to confirm correct adaptive jitter buffer operation	
2	Measure voice quality and end to end delay before and after application of 2100Hz tone, to confirm correct fixed jitter buffer operation	

PDV Routine		*Comments*	*Result*
1	Stepped increases in applied jitter as defined in ND1704		
2	Application of 2100Hz tone		

D	PDV Originating and Terminating On TDM	Reference
From end user on CP1 TDM, via CP1 TDM gateway and CP1 NGN, through NGN interconnect, via CP2 NGN and CP2 TDM gateway, to end user on CP2 TDM with calls being made in both directions		ND1704 [5]
The following checks should be made for each of the following calls		
1	Measure voice quality and end to end delay during to confirm correct adaptive jitter buffer operation	
2	Measure voice quality and end to end delay before and after application of 2100Hz tone, to confirm correct fixed jitter buffer operation	

PDV Routine		*Comments*	*Result*
1	Stepped increases in applied jitter as defined in ND1704		
2	Application of 2100Hz tone		

History

Document History		
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