

NGN Interconnect: PSTN Validation Testing Manual

NICC Standards Limited

Michael Faraday House,
Six Dials Way,
Stevenage
SG1 2AY

Tel.: +44(0) 20 7036 3636

Registered in England and Wales under number 6613589

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The Technical Secretary, NICC Standards Ltd.,

Michael Faraday House,
Six Dials Way,
Stevenage
SG1 2AY

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Foreword

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

Introduction

This document forms a Validation Testing Manual [IVTM] template that can be used by CPs as a basis for 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 *
- Integration (of model networks) - ND1414 [9] *
 - * 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 model testing takes place in order to ensure the proposed solution fulfils the basics required for an interconnect service.

It contains the minimum testing elements needed to test the basic 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 integration testing as defined in ND1414 [2].

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: Media Path Technical Specification |
| [11] | ND1628 | NGN Interconnect: Securing Data Flows with IPSec |
| [12] | ND1414 | NGN Interconnect: PSTN Integration Testing Manual |
| [13] | ND1012 | Interconnect Stream Control Transmission Protocol (SCTP) and Adaptation Layers |

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CP	Communication Provider
ICMP	Internet Control Message Protocol
IP	Internet Protocol
ISDN	Integrated Services Digital Network
IVT	Interoperability Validation Testing
MBF	Media Border Function
MSIL	Multi-Service Interconnect Link
NGN	Next Generation Network
NPDS	Network Performance Design Specification
PESQ	Perceptual Evaluation of Speech Quality
RTCP	Real Time Control Protocol
RTP	Real Time Protocol
SBF	Signalling Border Function
SCF	Session Control Function
SCTP	Stream Control Transport Protocol
SIP(I)	Session Initiation Protocol (ISUP)
TDM	Time Division Multiplex
VLAN	Virtual Local Area Network

4 Testing Recommendation

4.1 Recommended Architecture

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

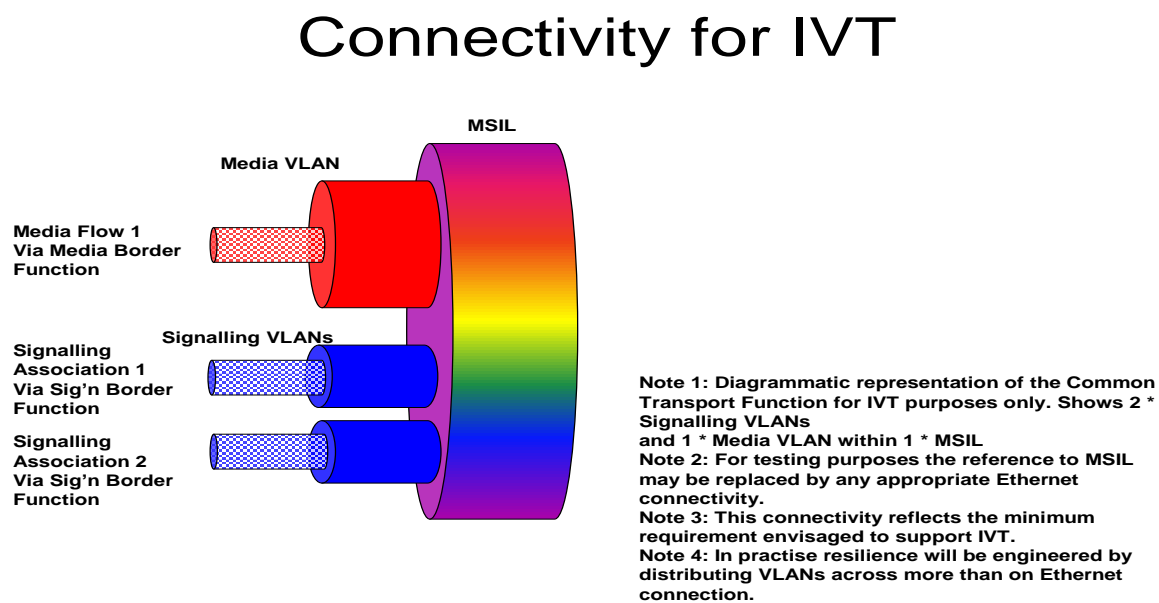


Figure 1 - Recommended Minimum Architecture for Testing

4.2 Reference Architecture

Within this manual 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”

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 Testing

All of the following tests should be completed in full.

5.1 IPSec

Note that IPSec may not be used in all cases

Test	Purpose
IVT01	Confirm establishment of agreed security association for encrypted connection and interoperability of IPSec between Signalling Border Functions

Test Name	Signalling Security	
Test Number	IVT01	
Test Purpose	Monitor IPSec protocol at the Signalling Control Function to test authentication, encryption and data integrity and operation as per ND1628 [11]	
Test Preconditions and assumptions	The SBFs have been connected to the common transport function The SBFs have been configured for service The common transport function has been configured for service Optical/electrical signal are on the iT4a Signalling Border Functions The IPSec tunnel is "up"	
Test Steps		Expected Results
1	Confirm IPSec is working	IPSec is working
2	Record the packets/bytes received, sent, dropped, errored in counters on iT4b interfaces on the peer signalling border functions	No packets or bytes lost or errored on iT4a interfaces on peer Signalling Border Functions Confirm IPSec counters are correctly incremented
3	Change the network key at the A end	Confirm that the signalling path disconnects at the Signalling Border Functions
4	Restore the key at the A end	Confirm signalling path restoration takes place
5	Change the network key at the B end	Confirm that the signalling path disconnects at the Signalling Border Functions
6	Restore the key at the B end	Confirm signalling path and IPSec restoration occurs
Test Clean up	Restore all signalling to service	

5.2 SCTP

Test	Purpose
IVT02	Successful establishment of the SCTP association
IVT03	Path Failure & Recovery In a Multi-Homed Association
IVT04	To verify the SCTP association shutdown and start-up procedures
IVT05	Effect of SCTP failures on call set-up and calls in progress

Test Name	Establish the SCTP Association	
Test Number	IVT02	
Test Purpose	Successful establishment of the SCTP association	
Test Preconditions and Assumptions	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	
Test Steps		Expected Results
1	Activate the SCTP association at both ends	Confirm initialisation on the primary path ND1012 [13]
2	Read own public SCTP association data at the SCTP end points and check for consistency at each end	There should be no cross connection between SCTP path addresses Refer to ND1119 [7] for SCTP timer values Note, for multi-homed associations there will be two addresses at each end and NAT functionality may prevent the private addresses being visible to the other end
3	Confirm the SCTP association is established by using the heartbeat on all paths	Heartbeat and Heartbeat Ack seen on all paths
Test Clean up		

Test Name	Path Failure & Recovery In a Multi-Homed Association	
Test Number	IVT03	
Test Purpose	Failure & recovery of one/both paths of a multi-homed association	
Test Preconditions and assumptions	It is recommended that CPs test the basic IP connectivity between fC1s by confirming that heartbeats are being exchanged on all paths	
Test Steps		Expected Results
1	Disable the primary SCTP path	Confirm that the SCTP association remains established via the alternate path using heartbeats and acknowledgements, and an indication is raised at both ends ND1012 [13]
2	Restore the primary SCTP path	Confirm that the primary path returns to the 'active' state and any alarm indication returns to normal
3	Repeat steps 1 & 2 for the secondary SCTP path	As above
4	Disable both paths of the SCTP association	Confirm that no heartbeats are responded to and an indication of the path failure is raised at both ends. After the error count has been reached the association will attempt to start-up (INIT chunks), verify no response
5	Restore the primary path	Confirm initialisation on the primary path and that the primary path returns to the 'active' state and any alarm indication returns to normal
6	Restore the secondary path	Confirm that the secondary path returns to the 'active' state and any alarm indication returns to normal
Test Clean up	All SCTP paths are restored to service Heartbeat and Heartbeat acknowledgements are seen on all paths and all alarm indications are normal	

Test Name	SCTP Association Shutdown and Re-Start	
Test Number	IVT04	
Test Purpose	To verify the SCTP association shutdown and start-up procedures	
Test Preconditions and Assumptions	The association is established	
Test Steps		Expected Results
1	A end disables the association using a graceful management interface method	Verify the shutdown messages from the monitoring equipment and at the B end and confirm that the association status has changed to 'down' ND1012 [13]
2	Re-establish association at A end	Confirm as per IVT02
3	Repeat from B end	As above
Test Clean up		

Test Name	Effect Of SCTP Failure On Calls	
Test Number	IVT05a	
Test Purpose	Effect of SCTP failure on call set-up	
Test Preconditions and Assumptions	1. A working NGN CC Interconnect link 2. The ability to make calls in both directions over the link 3. The ability to monitor the SIP-I signalling between the signalling border functions	
Test Steps		Expected Results
1	Start monitoring the SIP(I)	Confirm that Heartbeat and Heartbeat-Ack seen on both paths
2	Make a voice call across the NGN CC path and Confirm the call is in the ringing phase	Confirm that the call is sent over the Primary IP path ND1012 [13]
3	Fail a software card or IP connection	Confirm alarm output and observe heartbeat message activity
4	If ringing stops	Observe SIP message. Depending on configuration there may be no SIP indication that the call has failed
5	If ringing continues, answer the call after 10 seconds	Confirm appropriate SIP messages and that bothway conversation is possible
6	Release call and stop the monitoring	Confirm that correct SIP message flow is observed
7	Analyse the captured data	<p>If primary software card is failed, ringing will cease and there will be no SIP messages across the NGN CC path</p> <p>If Secondary software card is failed, ringing will continue and it will be possible to answer the call</p> <p>Failure of either an Active or Standby IP connection should not have any affect on the call and it should be possible to answer the call</p>
Test Clean up	Re-establish failed software cards and confirm that Heartbeat and Heartbeat-Ack seen on both paths. Confirm that all alarms have ceased.	
Test Name	Effect Of SCTP Failure On Calls	

Test Number	IVT05b	
Test Purpose	Effect of SCTP failures on calls in progress	
Test Preconditions and Assumptions	1. A working NGN CC Interconnect link 2. The ability to make calls in both directions over the link 3. The ability to monitor the SIP-I signalling between the signalling border functions	
Test Steps		Expected Results
1	Start monitoring the SIP(I)	Confirm that Heartbeat and Heartbeat-Ack seen on both paths
2	Make a voice call across the NGN CC path	Confirm that the call is sent over the Primary IP path
3	Answer the call after 10 seconds	Normal SIP message flow should be observed
4	Disconnect the software card or IP connection	Confirm appropriate alarm output and observe heartbeat message activity
5	Check if bothway transmission is still possible	Bothway conversation should still be possible
6	Re-establish the software card or IP connection	Confirm that alarms cease
7	Release call and stop the monitoring	Confirm that correct SIP message flow is observed
8	Analyse the captured data	
Test Clean up	Confirm that Heartbeat and Heartbeat-Ack are again seen on both paths and any alarms have cleared	

5.3 Media VLAN

Test	Purpose
IVT06	Confirm the correct establishment and operation of the RTP and RTCP connections between the media endpoints within the two media border functions
IVT07	Confirm that a failure of the media VLAN between the two media border functions is detected and correctly acted upon
IVT08	Confirm the appropriate operation of the bandwidth management function on the media VLAN

Test Name	RTP & RTCP Functionality	
Test Number	IVT06	
Test Purpose	Confirm the correct establishment and operation of the RTP and RTCP connections between the media endpoints within the two media border functions	
Test Preconditions and Assumptions	The ability to: 1. Make calls in both directions over the media 2. Monitor the SIP-I signalling between the signalling border functions 3. Monitor the RTP/RTCP packets between the two media border functions	
Test Steps		Expected Results
1	Monitor the SIP-I, RTP and RTCP	Packets are being captured from all data sources
2	Make a voice call from the A end to the B end and allow the call to ring for at least 15 seconds before answering	The call should be established normally and the caller should hear awaiting answer indication (AAI) before the called line answers
3	Answer the call and leave established for at least 120 seconds	The AAI should be removed and a both way speech path established which should be free from noticeable echo or other impairments
4	The calling end should clear, followed by the called end	The normal SIP-I release protocols should be followed and the RTP and RTCP streams should stop
5	Repeat steps 2 to 4 for a call from the B end	As above
6	Stop the packet capture and save the filtered output for all IP addresses and ports of interest	
7	Analyse the captured data	A two way RTP stream should be established between the media border functions using even numbered ports A both way RTCP association should be established between the media border functions using the adjacent odd numbered ports The RTP packets and RTCP messages (where transmitted) should be formatted in accordance with the requirements in ND1635 [10] An analysis of the packet stream should not show any unexplainable errors
8	Confirm that Media VLAN quality of service is captured	Use one of the methods specified in ND1625[9]
Test Clean up	Remove any monitoring and confirm that the media VLAN is functioning correctly	

Test Name	Media VLAN Failure	
Test Number	IVT07	
Test Purpose	Confirm that a failure of the media VLAN between the two media border functions is detected and correctly acted upon	
Test Preconditions and Assumptions	The ability to: 1. Make calls in both directions over the media 2. Monitor the SIP-I signalling between the signalling border functions 3. Monitor the RTP/RTCP packets between the two media border functions	
Test Steps		Expected Results
1	Make a simultaneous call from both ends in over the media VLAN to be failed. Allow each call to ring for at least 5 seconds before answering	The calls should be established normally and the callers should hear AAI (Awaiting Answer Indication) before the called line answers
2	Answer the calls and leave them established for at least 60 seconds	The AAI should be removed and a both way speech path established for each call. The speech paths should be free from noticeable echo or other impairments
3	Disconnect the media VLAN at the A end and wait until the calls are released or until at least 3 minutes (RTP inactivity timer) have elapsed	An indication should be raised from both media border functions and any calls terminated correctly either automatically or on customer clear-down
4	Attempt calls as per step 1	The calls should not be offered to the failed VLAN. They should either be rejected with a suitable indication or, if multiple media VLANs exist for the interconnect, then they may be routed via another VLAN
5	Restore the failed VLAN	
6	Attempt calls as per step 1	Traffic is carried normally over the restored media VLAN again
7	Repeat test with A and B roles reversed	As above
8	Repeat for all other Media VLANs within the signalling association	As above
9	Confirm that the SIP-I signaling gracefully ends all calls using appropriate messages in the correct sequence	ND1017 [18]
Test Clean up	All calls are released successfully	

Test Name	Bandwidth Management	
Test Number	IVT08	
Test Purpose	Confirm the appropriate operation of the bandwidth management function	
Test Preconditions and Assumptions	Media VLAN operating correctly	
Test Steps		Expected Results
1	Confirm the bandwidth setting at the Bandwidth Management Function is appropriate for the size of the media VLAN	
2	At the A end, reduce the bandwidth on the BMF so that only 3 ordinary PSTN calls will be permitted	N.B. allowance should be made for the emergency call bandwidth allocation
3	Make 3 ordinary simultaneous calls	Calls are successfully established
4	Generate an emergency (with priority) call	Call is successfully established
5	Restrict bandwidth further to the point where no bandwidth is available for emergency calls	
6	Generate another emergency (with priority) call	Confirm that the call does not appear on the test route
7	Generate further ordinary calls from A end	Confirm these call attempts do not succeed and an appropriate message is heard
8	Generate further ordinary calls from B end	
9	Repeat test from the B end	As Above
Test Clean up	Clear all calls and restore bandwidth to the appropriate level	

5.4 Quality of Service

Reports must be produced for all of these tests and supplied to the interconnecting CP.

Test	Purpose
IVT09	Confirm that end to end voice quality meets appropriate MoS levels for class 4/5 networks using PESQ statistical analysis
IVT10	Confirm the end to end delay falls within the acceptable range
IVT11	Confirm that the packet delay variation (PDV) and packet loss fall within the acceptable range

Currently, there is no agreed UK standard for measuring voice quality. Therefore, until such a standard is agreed, the following test procedure should only be performed between CPs which have a bilateral agreement to measure and manage call quality

Test Name	QoS - End To End Voice Quality	
Test Number	IVT09	
Test Purpose	Confirm that end to end voice quality meets appropriate MOS levels for class 4/5 networks using PESQ statistical analysis	
Test Preconditions and assumptions	<ol style="list-style-type: none"> 1. This test should be performed with a PESQ tester that is compliant to ITU-T Recommendation P.862 (02/01) and returns MOS-LQO scores on a scale of 1 to 5 according to the mapping defined in P.862.1 (11/03). 2. The test is an end-to-end test performed between two media end points and as such it is assumed to consist of 2 equal CP networks separated by Media Border Functions. 3. This test may be performed at the same time as the e2e delay test of IVT 15 (i.e. voice quality and e2e delay may be obtained from a single measurement process) 4. This test should be performed with the network loaded with typical network call volumes 	
Test Steps	Expected Results	
1	Connect a suitable tester to each endpoint	P.862.1 scores as appropriate to Class 4/5 Networks
2	Perform a simple "levels check" to Confirm that the tester is operating at the optimum signal level. This is usually done by making tests in each direction over a range of input signal levels and choosing the level that gives the best PESQ score	
3	Using the optimum signal level obtained in step 2, perform a minimum of 100 measurements by making 5 calls and performing 10 measurements in each direction	
4	Obtain the P.862.1 score for each measurement and calculate the average P.862.1 score for each direction (A-to-B and B-to-A). The average scores obtained in this way should be based on a minimum sample of 50 measurements	
5	Confirm that the average P.862.1 scores for each direction fall within the expected limits	
Test Clean up	Clear down all calls and disconnect tester	

Test Name	QoS - End To End Delay	
Test Number	IVT10	
Test Purpose	Confirm the end to end delay falls within the acceptable range	
Test Preconditions and assumptions	<ol style="list-style-type: none"> 1. This test should be performed with a tester that can measure end-to-end media path delay. A test that measures round-trip delay (RTD) is also acceptable, with the assumption that the RTD is twice the e2e delay 2. It is assumed that adaptive PDV buffers are used at each endpoint 3. The test is an end-to-end test performed between two media end points and as such it is assumed to consist of 2 equal CP networks separated by Media Border Functions 4. This test may be performed at the same time as the voice quality test defined in IVT14 (i.e. voice quality and e2e delay may be obtained from a single measurement process) 5. This test should be performed with the network loaded with typical network call volumes 	
Test Steps		Expected Results
1	Connect a suitable tester to each endpoint	<p>Maximum e2e delay =< 59 ms</p> <p>This figure is made up of 49 ms from Table 1 of ND1704 plus an allowance of 10 ms for propagation delay, A/D and D/A conversion and echo cancellation. The latter (10 ms) is a worst case figure and in practice, delays are expected to be considerably less</p>
2	Perform a minimum of 100 measurements by making 5 calls and performing 10 measurements in each direction	
3	Obtain the e2e delay in ms for each measurement and calculate the maximum e2e delay for each direction (A-to-B and B-to-A)	
4	Confirm that the maximum end to end delay falls within the limits defined for 2 CPs in Table 1 of ND1704 [5]	
Test Clean up	Clear down all calls and disconnect tester	

Test Name	QoS - Packet Delay Variation (PDV) & Packet Loss	
Test Number	IVT11	
Test Purpose	Confirm that Packet Delay Variation & Packet Loss fall within the acceptable range	
Test Preconditions and assumptions	<ol style="list-style-type: none"> 1. This test may use the RTCP-HR PDV and packet loss metrics defined in ND1625 [9] 2. The test is an end-to-end test performed between two media end points and as such it is assumed to consist of 2 equal CP networks separated by Media Border Functions 3. This test should be performed with the network loaded with typical network call volumes 	
Test Steps		Expected Results
1	Configure the Media Gateway endpoints to measure PDV and packet loss. This can be done using RTCP-HR according to ND1625. Note that PDV in this context is defined as the maximum cumulative packet delay variation (PDV) for a call and may need to be derived from the specific metrics available from RTCP-HR. Similarly, packet loss should be the cumulative packet loss for a call	99.9% of calls must have PDV <=14ms 99.9% of calls should not suffer any packet loss
2	Perform a minimum sample of 20,000 calls with a mean holding time of 150 seconds	
3	Obtain the PDV and packet loss for all the calls	
4	Confirm that the PDV and packet loss fall within the limits defined in ND1704 [5] for 2 CPs	
Test Clean up	Clear down all calls	

5.5 SIP & SDP Features

Test	Purpose
IVT12	Confirm that the content of the p-charging vector field is correct
	Confirm correct initial content and operation of max-forwards field
	Confirm the correct SIP URI address format is being used
	Confirm that an agreed signalling transport protocol is being used
	Confirm SIP Profile C is being used
	Confirm that appropriate Media Stream Definitions are used in the SDP (coding types, packetisation rate etc)

Test Name	SIP & SDP Features	
Test Number	IVT12	
Test Purpose	To Confirm that the appropriate information is provided in the call Invite	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Generate a call, answer and confirm:	
2	The correct SIP Profile C is being used; the correct p-charging vector is being used; the correct initial content and subsequent operation of max-forwards field	See ND1017 [8]
3	The correct SIP URI address format is being used; an agreed signalling transport protocol is being used	See ND1612 [4]
4	Confirm that appropriate media stream definitions are used in the SDP (coding types, packetisation rate etc)	See ND1612 [4] and ND1017 [8]
Test Clean up	Clear the call	

5.6 Call Conveyance

Signalling sequences and Call Duration Records must be recorded for all of these tests and provided to the interconnecting CP. For the expected test results, please refer to ND1412 [5]

Test	Purpose
IVT13	Successful Basic Telephony call, SCF to SCF, Enbloc and Overlap
IVT14	Successful Basic Telephony call, SCF to SCF with Diversion back to original SCF
IVT15	Successful Basic Telephony call with Priority
IVT16	CLI Functionality withheld/display/unavailable using national and international formats
IVT17	Incomplete call scenarios e.g. Busy, OOS, RTNR
IVT18	Successful Number Translation Service basic functionality (where required as a service)
IVT19	Successful Indirect Access / Carrier Pre-Select (where required as a service)
IVT20	Successful ISDN Transit or termination (as appropriate)

Test Name	Successful Basic Telephony Call	
Test Number	IVT13	
Test Purpose	Successful Basic Telephony call, SCF to SCF, Enbloc and Overlap	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Make a speech call between two SCFs	S4 P1 T1
2	Answer and confirm two way speech of acceptable quality	
3	Confirm that the network number is displayed to the called party	
4	Forward release the call	
5	Repeat for national & international number formats	
6	Repeat for Enbloc & Overlap signalling	
Test Clean up	Forward clear all calls	

Test Name	Call Forwarding Unconditional	
Test Number	IVT14	
Test Purpose	Successful Basic Telephony call, SCF to SCF with Diversion back to original SCF	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Make a speech call between two SCFs with calls forwarded back to 1 st SCF	S4 P1 T1
2	Answer	
3	Forward release the call	
Test Clean up	Forward clear all calls	

Test Name	Successful Basic Telephony Call With Priority	
Test Number	IVT15	
Test Purpose	Successful Basic Telephony call with Priority	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Make a priority speech call between two SCFs by dialling 999	S5 T1
2	Confirm that the Calling Party Category (CPC) =11 (Sub With Priority)	
3	Confirm that the destination digits = 999 + II Digits	
Test Clean up	Forward clear all calls	

Test Name	Calling Line Identity Unavailable / Withheld	
Test Number	IVT16	
Test Purpose	CLI Functionality withheld/display/unavailable using national and international formats	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Make data changes so that the call is marked 'Unavailable'	S4 P1 T1
2	Make a speech call	
3	Answer	
4	Forward release the call	
5	Confirm that the number is shown as 'Unavailable' to the called party	
6	Confirm that N FWD CL I A=0 (Blocking Not Available to Caller)	
7	Make a speech call, but restrict the calling identity	
8	Confirm that the calling identity is restricted to the called party	
9	Forward release the call	
Test Clean up	Forward clear all calls	

Test Name	Incomplete Call Scenarios	
Test Number	IVT17	
Test Purpose	Incomplete call scenarios e.g. Busy, OOS, RTNR	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Make a speech call to a 'Busy' DEL	S3 U1
2	Confirm that an appropriate tone or announcement is heard by the calling party	
3	Make a speech call to an 'Out of Service' DEL	S3 U2
4	Confirm that an appropriate tone or announcement is heard by the calling party	
5	Make a speech call to a DEL which has been made 'Spare'	S3 U3
6	Confirm that an appropriate announcement or tone is heard by the calling party	
7	Make a speech call to a DEL with 'Incoming Calls Barred' set	S3 U6
8	Confirm that an appropriate announcement or tone is heard	
9	Make a speech call	S4 T2c
10	Do not answer	
11	Wait for the called party answer timer to mature	
Test Clean up	Forward clear all calls	

Test Name	Successful Number Translation Call	
Test Number	IVT18	
Test Purpose	Successful Number Translation Service basic functionality (where required as a service)	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps	Expected Results	
Free To Caller Service (where supported)		
1	Make a speech call via the CPs 'Free to Caller' NTS service	
2	Confirm that the address complete message BCI charge indicator is set to "charge"	
3	Confirm that the network number is displayed to the called party	
4	Answer the call	
5	Confirm that when the answer message contains BCI, that the charge indicator is set to "charge"	
Chargeable To Caller Service		
1	Make a speech call via the CPs 'Chargeable to Caller' NTS service	S4 P1 T1
2	Confirm that the address complete message BCI charge indicator is set to "charge"	
3	Confirm that the network number is displayed to the called party	
4	Answer the call	
5	Confirm that when the answer message contains BCI, that the charge indicator is set to "charge"	
Test Clean up	Forward clear all calls	

Test Name	Indirect Access & Carrier Pre-Select	
Test Number	IVT19	
Test Purpose	Successful Indirect Access / Carrier Pre-Select Call (where required as a service)	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps		Expected Results
1	Make a call using the IA1 service	S2 P1 T1
2	Answer	
3	Forward release the call	
4	Confirm that the network number is displayed to the called party	
5	Make a call using the IA2 service	
6	Answer	
7	Forward release the call	
8	Confirm that the network number is displayed to the called party	
9	Make a call using the CPS service	
10	Answer	
11	Forward release the call	
12	Confirm that the network number is displayed to the called party	
Test Clean up	Forward clear all calls	

Test Name	Successful ISDN	
Test Number	IVT20	
Test Purpose	Successful ISDN Transit or termination (as appropriate), Data & Speech	
Test Preconditions and Assumptions	This test should be performed using signalling monitors	
Test Steps	Expected Results	
1	Make 9.6 / 19.2 / 64kbs data calls	S6 T1
2	Answer ('Auto Answer' where applicable)	
3	Forward release the call	
4	Confirm that the 'Presentation Number' / 'Connected Line Number' are displayed correctly	
5	From an ISDN Terminal make a speech call to an appropriate CPE	S7 P1 T1
6	Confirm the call is of acceptable quality	
7	Forward release the call	
8	Repeat the test, but using 3.1khz mode	
Test Clean up	Forward clear all calls	

Annex A: Test Completion Sheet

This form should be completed by a CP wishing to connect to another CP for PSTN NGN interconnection.

IVT Test	Completed	Pass/Fail	Comments
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Communication Provider Name	Authorised Name	Authorised Signature
Date	Reference	Issue Number

History

Document History		
1.2.4	28/09/09	TSG and CA Approved