SIN 376

Issue 1.5
August 2016

Suppliers' Information Note

For The BT Network

BT Wholesale Broadband SHDSL
Interface Description

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This SIN is available in Portable Document Format (pdf) from: http://www.btplc.com/sinet/

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1. Introduction

The information contained in this Supplier's Information Note (SIN) relates to BT Wholesale's Broadband SHDSL services.

Please note:

- **BT Datastream SHDSL is no longer available**
- **BT IPstream SHDSL is no longer available for new supply and has been fully retired from exchanges served by Wholesale Broadband Connect**

This SIN describes the interface specification as presented at the end of an SHDSL symmetric access to the End User's premises for all BT Wholesale Broadband SHDSL services. This SIN provides information for use by BT and Customers - Service Providers (SPs), Other Licensed Operators (OLOs), Other Network Operators (ONOs), and Corporate Businesses - and Customer Premises Equipment (CPE) manufacturers and developers.

Single pair High bit rate Digital Subscriber Line (SHDSL) is a bearer technology that BT will use to support its portfolio of Broadband Symmetric services. These services will utilise SHDSL technology as outlined in the ETSI specification TS 101 524[3], and ITU specification G.991.2[1], and referred to by the ITU as G.SHDSL

A specific Service Provider or End User provided SHDSL modem or terminating device is required. ADSL modems will not function with this service.

Service specific SINs relating to BT Wholesale Broadband SHDSL products are available from the SINet web site in Portable Document Format (pdf): http://www.btplc.com/sinet/

The Network Termination Point (NTP) will be the socket on the BT provided NTE for new orders placed from 30th June 2006 and on a SHDSL Service Specific Front Plate (SSFP) for supply prior to 30th June 2006– Figures 1 & 2.

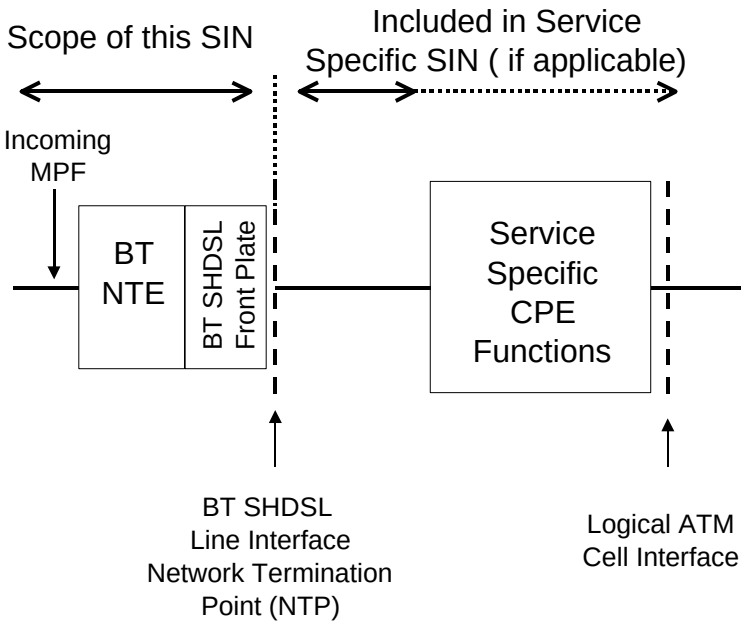

Figure 1. Scope of this SHDSL Supplier Information Note – with Service Specific Front Plate

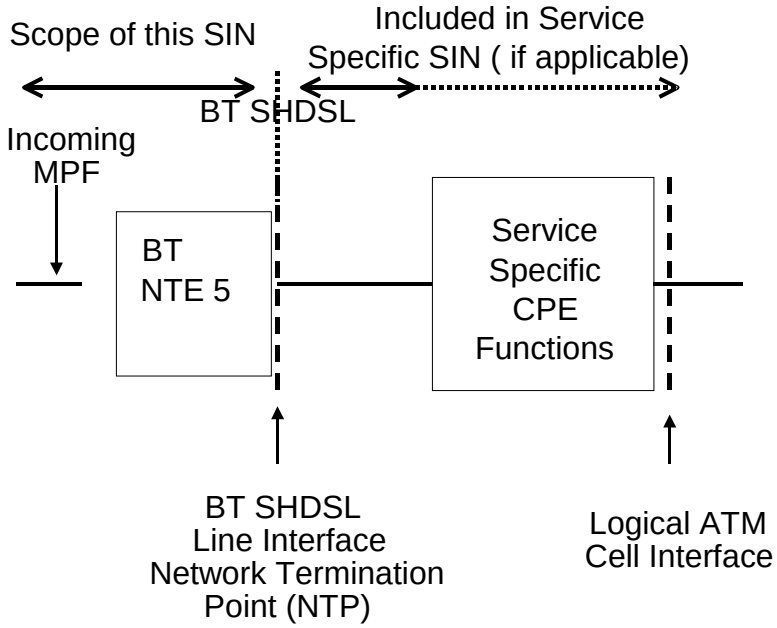

Figure 2. Scope of SHDSL Supplier Information Note - with NTE 5 ONLY presentation
(for new orders placed from 30th June 2006)

2. Installation topology

The BT SHDSL Metallic Path Facility (MPF) to which this SIN relates will terminate at either the BT NTE (for new orders placed from 30th June 2006), or a socket on a SHDSL Service Specific Front Plate (SSFP) fitted to the standard NTE (for installed base prior to 30th June 2006) Figure 3. The front plate is known as the SHDSL SSFP and it presents a socket to the End User for connection of SHDSL equipment (e.g. SHDSL Modem).

The SHDSL SSFP does not incorporate a Customer Wiring Module and thus it does not facilitate wiring of extensions. SHDSL technology requires a dedicated Metallic Path Facility (MPF), therefore no other service may be supported on the same line.

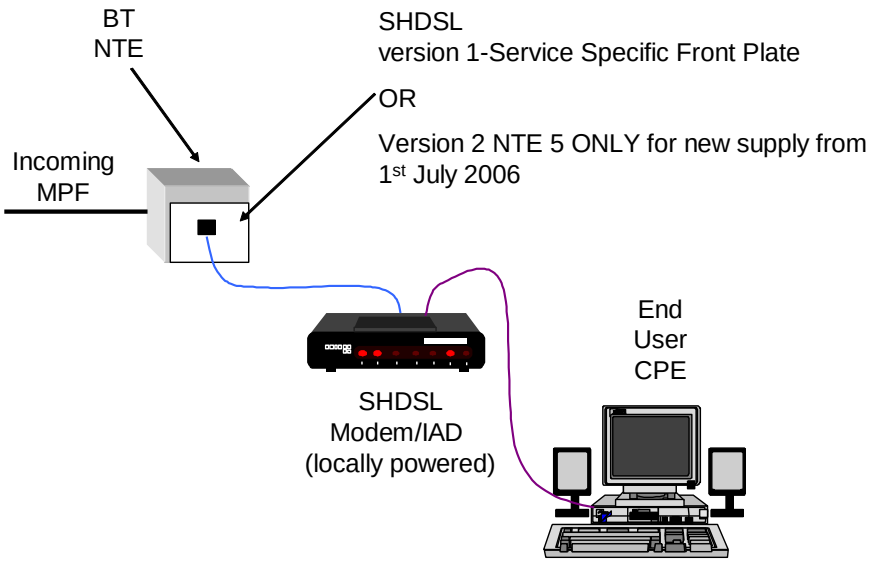

Figure 3. End User SHDSL Modem Connection Topology

3. Physical Interface

3.1 NTE5

For orders placed after 30th June 2006 the standard SHDSL installation will use an NTE5 fitted with a normal telephony front plate. The connections for this are described in SIN351[7] and reproduced in Table 1 for information. The pin numbering convention is from the left looking into the socket with the contacts uppermost. The SHDSL connection is to the 'A' and 'B' wires on pins 2 and 5 of this connector. Polarity is unimportant.

1	Not Used for PSTN
2	'A' wire or 'B' wire
3	Local earth when required
4	Shunt connection, when required
5	'B' wire or 'A' wire
6	Not Used for PSTN

Note : Contact pin 6 is adjacent to the latch.

Table 1. BT NTE5 Master Socket Contacts

A converter lead will be required between the telephone plug (pins 2/5) for connection at the NTE5 and RJ11 (on pins 3/4) for connection at the SHDSL modem end. Alternatively, it should be possible to use a suitable ADSL micro-filter, which provides the conversion between telephone plug and RJ11 socket, and then a straight RJ11-RJ11 lead to the SHDSL modem.

3.2 Service Specific Front Plate

The installed base prior to 30th June 2006 will remain with an NTE provided with an SHDSL Service Specific Front Plate (SSFP) shown in Figure 4

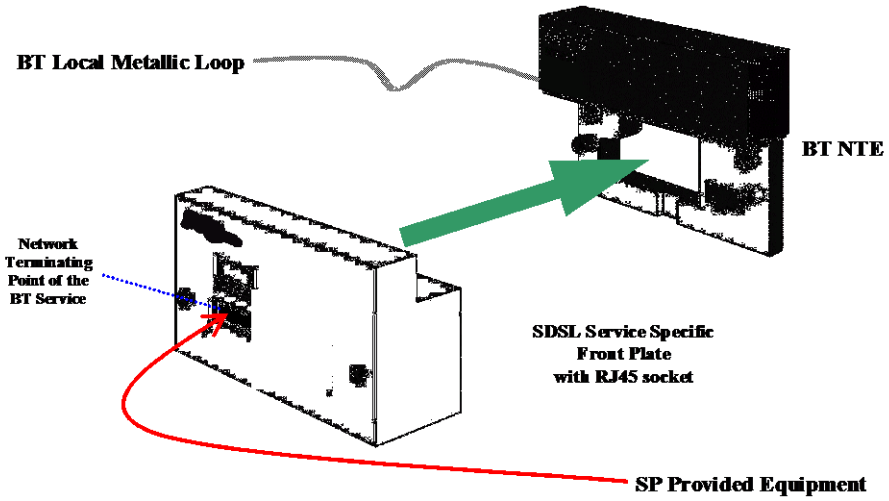

Figure 4. Standard BT NTE and SHDSL Service Specific Front Plate

The SHDSL SSFP plugs into the NTE in place of the standard NTE front plate and presents a socket for connection of SHDSL CPE. The SHDSL connection is presented on the middle two pins of the socket, and corresponds to pins 4 & 5 of a RJ45 plug and to pins 3 & 4 of a RJ11 plug (which has only 6 pins).A standard (straight) RJ45/RJ11 lead can be used for connection to the SHDSL modem. Polarity is unimportant. The other pins are not connected. Pin numbering of the socket is 1 to 8 from the left, looking into the socket with the contacts uppermost.

4. SHDSL Electrical Interface

The SHDSL interface is compliant with ITU G991.2 (Annex B European)[1] and ITU G.994.1[2] and ETSI TS 101 524[3].

4.1 SHDSL Data Rate

The data rate at which the SHDSL MPF operates is configured by the BT network and will depend upon the requirements of the subscribed service, the capability of each individual MPF, and the need to adhere to the UK Access Network Frequency Plan (see section 5.3).

4.2 ATM VPI / VCI

The number and VPI / VCI of the ATM virtual circuits transported by the SHDSL MPF will depend upon the subscribed service and will be defined in related service specific SINs.

5. SHDSL modem device attachment recommendations

BT Wholesale does not control the choice of SHDSL modem for these services and it cannot guarantee that any particular item of equipment will work correctly with the network. The following recommendations represent good practice that will improve the probability of correct operation.

5.1 SHDSL Electrical Specifications

It is recommended that SHDSL modems comply with the ITU and ETSI specifications described in Section 4 of this document.

5.2 Wetting Current and Power Feeding

The BT network will provide wetting current and in accordance with ETSI TS 101 524[3], the modem should sink a small amount of current. The BT network will not provide sufficient current to power the SHDSL modem.

Under fault conditions the wires of the MPF may be shorted, reversed or disconnected. The modem may be inadvertently connected to other BT services such as an analogue voice line (described in SIN351[7]). The modem should be robust against the electrical conditions of such a line.

5.3 Access Network Frequency Plan

All users of the BT access network must comply with the Access Network Frequency Plan (ANFP)[5] for the BT Network. This document, published by Oftel, is designed to control interactions between DSL technologies installed in multi pair cables.
The ANFP assigns a category to each access line and users of the network should be aware that certain SHDSL systems comply with the ANFP only on certain categories of lines. Installations that do not comply with the ANFP may be disconnected if they are found to cause interference to other services. BT determines the ANFP category of an individual line.

5.4 Operations and Maintenance Functionality

***Note**. Support within the End User CPE for the OAM cells described in this section will allow BT to diagnose faults at the ATM layer. Failure to support this I.610 functionality may lead to extra field force activity for which the Customer may be charged.*

SHDSL CPE should be able to loop back all downstream traffic received on VPI0 VCI21 to the same VPI/VCI in the upstream direction (subject to a maximum data rate of 5kbit/s). This is so that a BT test system can perform a simple connectivity / performance test using ITU O.191[6]] test cells.

In order for BT to perform ATM layer diagnostics all End User CPE should support the following aspects of ITU-T Recommendation I.610, 'B-ISDN operation and maintenance principles and functions' (02/99)[4].

5.4.1 VP Continuity Check (CC) (I.610 Sect. 9.2.1.1.2)

Procedures for activation (and associated deactivation) of CC cells are described in I.610 Sect 9.2.3

ATM layer OAM cell formats can be found in I.610 Sect. 10. Details of the specific fields required to identify a continuity check cell can be found in I.610 Sect. 10.2.2. Details of the specific fields required to identify activation/deactivation cells can be found in I.610 Sect. 10.4. State diagrams detailing the activation/deactivation procedures of CC cells are shown in ANNEX B 'SDLs for activation/deactivation using OAM cells'.

Both e-t-e_VP-CC and seg_VP_CC should be supported.

5.4.2 VP performance management functions (FPM and BR cells) (I.610 Sect. 9.2.1.2)

I.610 Table 1 gives the list of cell types that should be considered as a "user cell" for VP performance monitoring.

Procedures for activation (and associated deactivation) of FPM and BR cells are described in 9.2.3.

Specific fields for performance management cells are given in I.610 Sect. 10.3.

Details of the specific fields required to identify activation/deactivation cells can be found in I.610 Sect. 10.4. State diagrams detailing the activation/deactivation procedures of performance monitoring cells are shown in ANNEX B 'SDLs for activation/deactivation using OAM cells'.

APPENDIX II contains informative material related to the insertion process applicable to end-to-end or segment performance management cells.

Both e-t-e_VP-FPM and seg_VP_FPM should be supported.

Both e-t-e_VP-BR and seg_VP_BR should be supported.

5.4.3 F4 Flows (I.610 Sect. 9.2.1.)

F4 OAM cells operate at the virtual path level. The flow mechanisms for F4 cells can be found in I.610 Sect. 7.2.1. F4 cells are distinguished by set values of the VCI field in the ATM header. These values can be found in Table 1/I.610 - "User cells" at F4 level. A general description of OAM functions for the VPC (F4 flow) can be found in I.610 Sect. 9.2.1.

5.4.4 F5 Flows (I.610 Sect. 9.2.2.)

F5 OAM cells operate at the virtual channel level. The flow mechanisms for F5 cells can be found in I.610 Sect. 7.2.2. F5 cells are distinguished by set values of the PTI field in the ATM header. These values can be found in Table 2/I.610 - "User cells" at F5 level. A general description of OAM functions for the VCC (F5 flow) can be found in I.610 Sect. 9.2.2.

5.4.5 VC-AIS and VC-RDI defect indication (I.610 Sect. 9.2.2.1.1)

ATM layer OAM cell formats can be found in I.610 Sect. 10. Details of the specific fields required to identify AIS/RDI cells can be found in I.610 Sect. 10.2.21.

Both e-t-e_VC-AIS and seg_VC_AIS should be supported.

Both e-t-e_VC-RDI and seg_VC_RDI should be supported.

5.4.6 VC Continuity Check (CC) (I.610 Sect. 9.2.2.1.2)

Procedures for activation (and associated deactivation) of CC cells are described in I.610 Sect 9.2.3.

ATM layer OAM cell formats can be found in I.610 Sect. 10. Details of the specific fields required to identify a continuity check cell can be found in I.610 Sect. 10.2.2. Details of the specific fields required to identify activation/deactivation cells can be found in I.610 Sect. 10.4. State diagrams detailing the activation/deactivation procedures of CC cells are shown in ANNEX B 'SDLs for activation/deactivation using OAM cells'.

Both e-t-e_VC-CC and seg_VC_CC should be supported.

5.4.7 VC Loopback (LB) (I.610 Sect. 9.2.2.1.3)

ATM layer OAM cell formats can be found in I.610 Sect. 10. Details of the specific fields required to identify a loopback cell can be found in I.610 Sect. 10.2.3.

Upon receipt of a Loopback cell the CPE shall follow the procedure laid down in I.610 ANNEX C 'Procedures to be performed when receiving LB cells'.

Both e-t-e_VC-LB and seg_VC_LB should be supported.

5.4.8 VC performance management functions (FPM and BR cells) (I.610 Sect. 9.2.2.2)

I.610 Table 2 gives the list of cell types that should be considered as a "user cell" for VC performance monitoring.

Procedures for activation (and associated deactivation) of FPM and BR cells are described in 9.2.3.

Specific fields for performance management cells are given in I.610 Sect. 10.3.

Details of the specific fields required to identify activation/deactivation cells can be found in I.610 Sect. 10.4. State diagrams detailing the activation/deactivation procedures of performance monitoring cells are shown in ANNEX B 'SDLs for activation/deactivation using OAM cells'.

APPENDIX II contains informative material related to the insertion process applicable to end-to-end or segment performance management cells.
Both e-t-e_VC-FPM and seg_VC_FPM should be supported.
Both e-t-e_VC-BR and seg_VC_BR should be supported.

6. SHDSL Modem Test Facilities

It should be noted that BT provide a CPE test laboratory to enable suppliers and Customers to satisfy themselves that their CPE and services will interoperate correctly with BT's SHDSL services.

For further details please see: http://www.btplc.com/sinet/

7. References

For document sources please refer to:- http://www.btplc.com/sinet/

[1]	ITU G.991.2	Single-pair high-speed digital subscriber line (SHDSL) transceivers	ITU
[2]	ITU G.994.1	Handshake Procedures for Digital Subscriber Line Transceivers	ITU
[3]	ETSI TS 101 524	Access Transmission system on metallic access cables Symmetrical single pair high bit rate Digital Subscriber Line (SDSL)	ETSI
[4]	ITU I.610	B-ISDN operation and maintenance principles and functions	ITU
[5]	OTR 004	Access Network Frequency Plan applicable to transmission systems used on the BT Network. Oftel Technical requirement.	NICC
[6]	ITU O.191	Equipment to assess ATM layer cell transfer performance	ITU
[7]	SIN 351	BT Public Switched Telephone Network (PSTN): Technical Characteristics Of The Single Analogue Line Interface	BT

8. Abbreviations

Acronym	Expansions
ADSL	Asymmetric Digital Subscriber Line
AIS	Alarm Indication Signal
ANFP	Access Network Frequency Plan
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Service Digital Network [ITU-T]
BR	Term from I.610 Sect. 9.2.1.2 & 9.2.2.2
BS	British Standards
BT	British Telecommunications plc
BTNR	BT Network Requirement [BT]
CBR	Constant Bit Rate
CC	Continuity Check
CDvt	Cell Delay Variation Tolerance
CLP	Cell Loss Priority (bit)
CPE	Customers' Premises Equipment
DP	Distribution Point
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Loop Access Multiplier
EE	Equipment Engineering
EFCI	Explicit Forward Congestion Indication
EN	European Norm
ETS	European Telecommunications Standard [ETSI]
ETSI	European Telecommunications Standards Institute
EUA	End User Access
EUDP	End User Data Path
F4	Flow 4 [ATM]
F5	Flow 5 [ATM]
FC	Fibre Connector
FCPC	Fibre Connector Physical Contact
FPM	Forward Performance Monitoring [ATM]
G.SHDSL	Specification Single pair High bit rate Digital Subscriber Line
I.610	B-ISDN operation and maintenance principles and functions [ITU-T]
ITU	International Telecommunications Union
ITU-T	International Telecommunication Union - Telecommunications
LB	Loop Back
MODEM	Modulator Demodulator
MPF	Metallic Path Facility

Acronym	Expansions
NICC	Network Interoperabilty Consultative Committee
NTE	Network Termination Equipment
NTE5	Network Terminating Equipment No. 5
NTP	Network Terminating Point
OAM	Operations And Maintenance
OLO	Other Licensed Operator
ONO	Other Network Operator
PCR	Peak Cell Rate
PSTN	Public Switched Telephone Network
PT	Payload Type
PTI	Payload Type Identifier
PVC	Permanent Virtual Circuit
RDI	Remote Defect Indication
RJ11	Registered Jack 11
RJ45	Registered Jack 45
SCR	Sustained Cell Rate
SDH	Synchronous Digital Hierarchy [ITU-T]
SDL	Specification and Description Language [ITU-T X.200]
SHDSL	Single pair High bit rate Digital Subscriber Line
SIN	Suppliers Information Note
SP	Service Provider
SPIN	Service Provider Industry Notification [BT]
SSFP	Service Specific Front Plate
SIN	Suppliers' Information Note
VBR	Variable Bit Rate
VBRnrt	Variable Bit Rate non real-time
VBRrt	Variable Bit Rate real-time
VC	Virtual Connection [ATM]
VCC	Virtual Circuit Connection
VCI	Virtual Connection Identifier [ATM]
VP	Virtual Path
VPC	Virtual Path Connection
VPI	Virtual Path Identifier [ATM]

9. History

Status	Date	Details of Change
STIN Issue 1.0	8 August 2002	First Published as STIN.
STIN Issue 1.1	11 February 2003	Up issued to support ongoing trial.
Issue 1.0	11 August 2003	Document re-issued in SIN format. Clause on approval requirements removed.
Issue 1.1	31 March 2006	Change from SSFP to standard NTE for EU
Issue 1.2	19 October 2006	Pin numbers added to description of NTE5 presentation.
Issue 1.3	11 April 2013	Note added in introduction relating to service availability due to retirement of 20CN Broadband
Issue 1.4	May 2015	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/
Issue 1.5	August 2016	Note updated on service availability due to the retirement of 20C broadband.

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