



# SIN 374

Issue 1.4  
April 2008

## Suppliers' Information Note

*For The BT Network*

---

---

### **L2TP Interface For BT IPstream Interface Characteristics**

Each SIN is the copyright of British Telecommunications plc. Reproduction of the SIN is permitted only in its entirety, to disseminate information on the BT Network within your organisation. You must not edit or amend any SIN or reproduce extracts. You must not remove BT trade marks, notices, headings or copyright markings.

This document does not form a part of any contract with BT customers or suppliers.

Users of this document should not rely solely on the information in this document, but should carry out their own tests to satisfy themselves that terminal equipment will work with the BT network.

BT reserves the right to amend or replace any or all of the information in this document.

BT shall have no liability in contract, tort or otherwise for any loss or damage, howsoever arising from use of, or reliance upon, the information in this document by any person.

Due to technological limitations a very small percentage of customer interfaces may not comply with some of the individual characteristics which may be defined in this document.

Publication of this Suppliers' Information Note does not give or imply any licence to any intellectual property rights belonging to British Telecommunications plc or others. It is your sole responsibility to obtain any licences, permissions or consents which may be necessary if you choose to act on the information supplied in the SIN.

Those BT services marked ® indicates it is a registered trade mark of British Telecommunications plc.

Those BT services marked ™ indicates it is a trade mark of British Telecommunications plc.

This SIN is available in Portable Document Format (pdf) from: <http://www.sinet.bt.com/index.htm>

Enquiries relating to this document should be directed to: [help@sinet.bt.com](mailto:help@sinet.bt.com)

# CONTENTS

<b>1. INTRODUCTION.....</b>	<b>3</b>
1.1 DEFINITIONS .....	3
1.2 SERVICE OUTLINE.....	3
<b>2. TECHNICAL SPECIFICATION FOR CUSTOMER INTERFACE.....</b>	<b>5</b>
2.1 ATM LAYER.....	5
2.2 TRANSPORT IP LAYER.....	5
2.3 L2TP LAYER.....	6
2.4 PPP LAYER .....	6
2.4.1 <i>Session Timeouts</i> .....	7
2.4.2 <i>End User CPE requirements.</i> .....	8
2.5 END USER IP LAYER.....	8
2.6 NETWORK TERMINATING EQUIPMENT (NTE) .....	8
2.7 PPPoE AND BT CENTRAL L2TP PASSTHROUGH.....	8
2.8 DOMAIN NAME OPTIONS – DOMAIN NAMELESS AND BT CENTRAL L2TP PASSTHROUGH. ....	9
<b>3. FURTHER INFORMATION CONTACT POINTS.....</b>	<b>9</b>
<b>4. REFERENCES.....</b>	<b>10</b>
<b>5. ACRONYMS.....</b>	<b>10</b>
<b>6. HISTORY .....</b>	<b>12</b>
<b>ANNEX A - DIFFERENCES COMPARED TO PREVIOUS ISSUE OF SIN 374.....</b>	<b>13</b>
TABLE A. 1 LIST OF MAJOR CHANGES FROM PREVIOUS ISSUE OF SIN 374 .....	13

## 1. INTRODUCTION

This Suppliers' Information Note (SIN) describes the characteristics of the 155Mbits/s L2TP (Layer 2 Tunnelling Protocol) Interface available for BT IPstream only, and does not apply to any other BT Service. Other BT services may provide a different form of L2TP interface. The BT Central product provides a connection from the BT Network to the Customer and is a necessary component for the end to end connection of BT IPstream Office, BT IPstream Home, BT IPstream Max, BT IPstream Max Premium or BT IPstream Symmetric products to the Customer. The IPstream 622Mbits/s L2TP passthrough product is described in SIN 412. This document provides information for Manufacturers, Suppliers and Customers – Independent Service Providers (SPs), Other Licensed Operators (OLOs), Other Network Operators (ONOs), and Corporate Businesses wishing to use this product to connect a number of End Users to their network.

### 1.1 Definitions

**Customer** - The Communication Provider (CP) or Corporate Customer (CC) who purchases BT IPstream service from BT and sells or provides it to 'End Users.

**End User** - The person using their PC to connect to an CP/CC's IP network via the BT IPstream service.

**L2TP Tunnel Concentrator** - Where an L2TP Tunnel Switch is used to concentrate or reduce the number of tunnels presented.

**L2TP Passthrough** – Passing through the L2TP tunnels to the Customer.

For further definitions please refer to RFC2661 <sup>[4]</sup>.

### 1.2 Service Outline

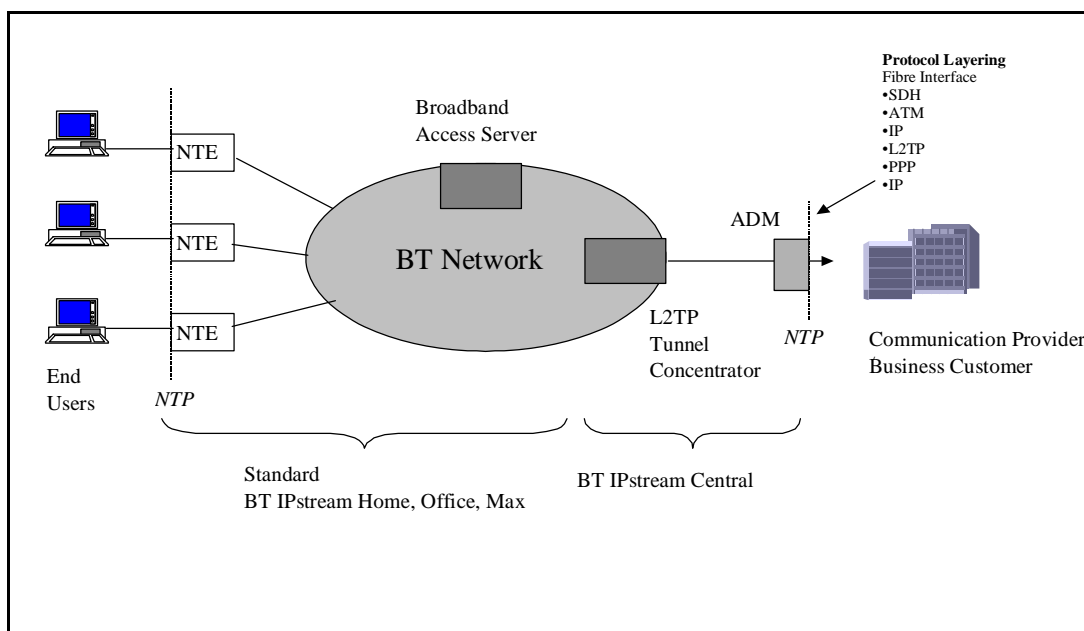


Figure 1. Basic architecture of the BT IPstream 'L2TP Passthrough' product.

BT IPstream 'L2TP Passthrough' is a variant of the standard IPstream Central that allows the Customer to have direct access to their End User's PPP sessions. End User PPP sessions are presented to the Customer in L2TP tunnels. The BT IPstream End User access products remain unaltered. The Customer must ensure that the BT End User NTE is presented with an IP environment (e.g. provision of DNS resolver addresses) identical to that provided by the standard BT IPstream service.

The BT IPstream Central product with L2TP provides connectivity between the Customer's premises and BT's high speed data network, via an 'L2TP Tunnel Concentrator'. The L2TP Tunnel Concentrator's main function is to isolate the Customer from the complexity of the BT network. The L2TP Tunnel Concentrator marks the last point at which the service can be managed by BT.

The Customer must provide the following information to BT in order for the service to function:

- IP addresses for BT's L2TP Tunnel Concentrator's physical ports facing the Customer
- Loop back addresses for BT's L2TP Tunnel Concentrators
- IP addresses for the Customer's end of the ATM VCs
- A test user account for end-to-end connectivity testing

and for each of the Customer's L2TP tunnel end points on the Customer's side of the interface<sup>i</sup>:-

- Its IP address.

The Customer will provide the following:-

- The L2TP Tunnel Peer Name that the Customer will accept from BT's LTSs.
- The L2TP Tunnel password that the Customer will accept from BT's LTSs when presenting tunnels.

Note: The Customer has the option of not specifying the L2TP Tunnel Peer Name.

The ATM connection from BT presents two VPs containing a single VC from each of BT's Tunnel concentrators. The Customer will normally terminate the VCs on either a single LNS or LTS or on a router with access to multiple LNSs or LTSs. An alternative would be for the Customer to ATM switch the VCs to separate IP devices – in this case the Customer should ensure that each of their Tunnel end points are reachable from each of the two VCs.

---

<sup>i</sup> This is the immediate end point on the 'Customer's side of the interface as far as the 'L2TP Tunnel Concentrator' is concerned – it may be that the Customer's equipment may forward the PPP sessions into further tunnels, which terminate deeper into their network.

---

BT recommends the use of non-real time VBR for VC shaping, with the peak and sustain parameters set at 74.880 Mbit/s. The burst cell delay variation tolerance (CDVT) is 290 µs.

The Customer will normally allocate a /30 IP address range for each VC presented, this gives two usable IP addresses. One address from this range will be used for the BT L2TP Tunnel Concentrator, the other for the router, LNS or LTS at the Customer's end of the link. The VPI and VCI values are negotiated during the install process, but normally default to VPI values 101 and 201 with a VCI value of 35.

## **2. TECHNICAL SPECIFICATION FOR CUSTOMER INTERFACE**

The interface is End User IP over PPP over L2TP over UDP over IP over ATM over SDH, delivered on Single Mode OC3 optical interface – the connector type is FC/PC (Fibre Connector/Polished Contact – see <sup>[14]</sup>.

The product is an option of the BT Central, and is only available at 155Mbits (STM-1) – the 622Mbps L2TP passthrough product is described in <sup>[13]</sup>.

<b>Bandwidth</b>	<b>Interface Presentation</b>	<b>Maximum Simultaneous Sessions</b>
155Mbits/s	Single Mode STM-1	8000

**Table 1 - 'L2TP Passthrough' BT Central available bandwidths**

### **Notes:**

- The BT Central products must not be overbooked in terms of the numbers of sessions. Additional End User's sessions will not be presented to the Customer when the number exceeds the maximums given in Table 1.
- The BT Central Service will experience a lower IP traffic throughput than the purchased service line-rate due to the overhead of the lower layer protocols.  
Please refer to SIN 329 <sup>[8]</sup>.

### **2.1 ATM Layer**

Please refer to SIN 347<sup>[10]</sup>.

The BT Central L2TP service does not currently support the use of OAM F4 or F5. BT are planning to introduce OAM F5 support toward the end of 2003.

### **2.2 Transport IP Layer**

This layer must conform to RFC 791<sup>[7]</sup>.

There is no requirement for a routing protocol to be used – static routes are configured instead.

The MTU size associated with this layer needs to be at least 1542 to allow 1500 byte packets to be sent un-fragmented to the BT-RAS and hence improve the performance of the BT IPstream service received by End Users. The use of an MTU size of at least 1542 bytes on this interface will be mandatory from the middle of 2003. BT, however, recommends Customers use a MTU size of 1600 bytes on this interface to allow for future enhancements. BT will use an MTU size of 1600 bytes on this interface.

### **2.3 L2TP Layer**

The L2TP Tunnel Concentrator can deliver dynamic<sup>ii</sup> L2TP tunnels to a maximum of four end points in the Customer's network. These end points would usually be expected to be LNSs or LTSs – in either case the Customer's equipment terminating tunnels must conform to RFC 2661 <sup>[4]</sup>.

The L2TP passthrough service attempts to balance the number of sessions on each of the Customer's tunnel endpoints by sending each new session to the tunnel endpoint with the least sessions. This balancing is only from the viewpoint of each of the tunnel sources within the BT Network (the BT LTSs) – the tunnel sources have no visibility of the loading placed on Customer tunnel endpoints by other BT tunnel sources.

A maximum concurrent session count of 8000 will be enforced across all the tunnels leaving the BT L2TP Tunnel Concentrators. Each customer tunnel end point will receive at most  $8000/N$  sessions – where N is the number of Customer tunnel endpoints.

At a point following launch the service will be enhanced such that the maximum number of sessions in any one tunnel can be controlled by the tunnel end point signalling with L2TP Call Disconnect Notify (CDN) messages.

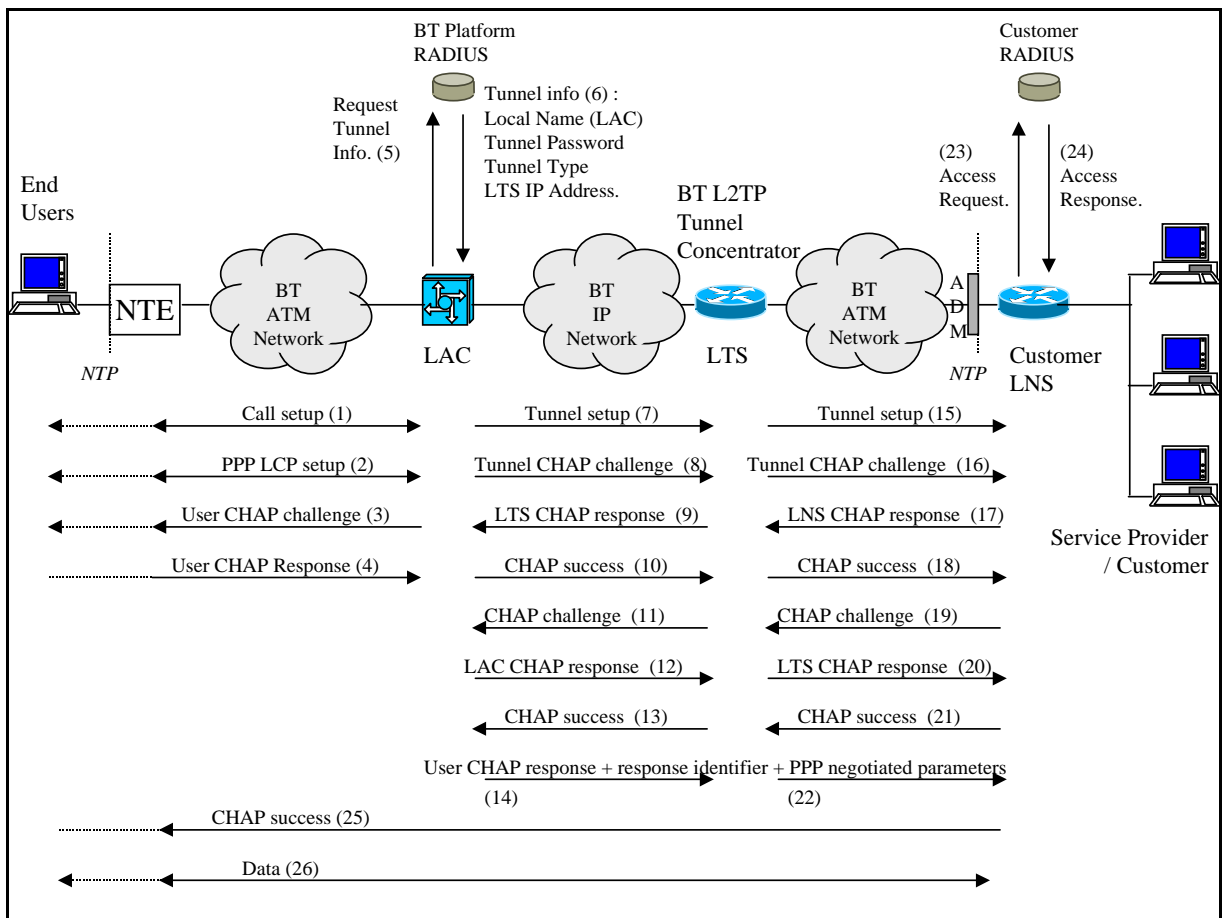
The Customer provides the L2TP Tunnel Peer Name presented by the BT LTSs, and also provides the Password presented to the BT LTSs. The Customer has the option of not specifying the L2TP Tunnel Peer Name if they wish (referred to as 'unnamed' operation).

### **2.4 PPP Layer**

The Customer's terminating equipment must support PPP conforming to RFC 1661 <sup>[3]</sup>, RFC 1994 <sup>[6]</sup> and RFC 1877 <sup>[5]</sup>. Authentication using CHAP (Challenge Handshake Authentication Protocol) will be requested during the Link Establishment phase. The user name and domain name captured from the End User and PPP negotiated parameters will be replayed from the BT's LAC via BT's LTS to the Customer's LNS – see message 22 in the following diagram.

---

<sup>ii</sup> Tunnels are opened on the first session and closed on the last.



**Figure 2. PPP Stages with 'L2TP Passthrough'.**

Messages [1 to 4] are sent as a result of the End User initiating a PPP session. This request initiates a dialogue with the BT Platform RADIUS, from the BT LAC. As a result of determining the BT Central connection destination, providing a L2TP Passthrough, the BT LAC attempts to set up a tunnel to the L2TP Tunnel Concentrator serving to the Customer [7 to 14]. As a result of this dialogue, the L2TP Tunnel Concentrator attempts to set up a tunnel to the Customer's termination point (shown as a LNS in Figure 2) [15 to 22]. When a session is accepted [23, 24], the PPP session is connected through from the End User NTE to the Customer's LNS [25, 26].

### 2.4.1 Session Timeouts

The Customer must enforce a minimum session timeout so all established sessions will last for a minimum of two hours (7200 seconds) for both the PPP idle and PPP session timeouts. An End User may terminate their session at any time. This ensures that the BT network is not overburdened with the churn of PPP sessions. BT will monitor the rate of session set-ups to ensure that this criterion is met.

## **2.4.2 End User CPE requirements.**

BT's End User CPE requires an IP address to be returned from the Customer's LNS during the set-up phase of the PPP session.

BT's End User CPE requires Primary and Secondary DNS server IP addresses to be returned from the Customer's LNS, during the PPP LCP phase<sup>[5]</sup>. This is in line with the BT IPstream service as defined in SIN 329<sup>[8]</sup>.

## **2.5 End User IP Layer**

This layer must conform to RFC 791<sup>[7]</sup>.

## **2.6 Network Terminating Equipment (NTE)**

The Customer must have sufficient space available to accommodate the NTE9(s) delivering the STM-1 connection(s) to their equipment. Each NTE fits within a 300mm or 600mm deep ETSI equipment rack conforming to ETS 300 119<sup>[1]</sup>. The NTE is locally powered, and will require a minimum of two local main 50Hz AC supplies fused as 20 amps.

The NTE may also be powered by a back up battery system supplied by BT, as a chargeable option, or self provided by the Customer. Where the NTE power supply is self provided by the Customer, -50 volts, 125 watts, the NTE will be supplied with a power connection lead which will be presented as wires only. As power supplies can vary slightly in output voltage and characteristics, the NTE will function with Customer provided power supplies which are in accordance with the British Telecom Network Requirement (BTNR) 2511<sup>[2]</sup>.

It is the Customer's responsibility to provide the physical interconnect between BT's NTE and their equipment.

## **2.7 PPPoE and BT Central L2TP Passthrough**

If a Customer's End Users are using PPPoE (see SIN 386<sup>[11]</sup> section 4.4.2.7) then they should be aware of the following behaviour with BT Central L2TP Passthrough.

PPPoE clients should behave as per RFC2516<sup>[9]</sup> and RFC1661<sup>[3]</sup> – if so:-

- PPPoE End User client should send an MRU of 1492 Bytes or less to the BT LAC in the BAS.
- The BT LAC (in the BAS) will send an MRU of 1492 Bytes to the PPPoE client.
- The PPPoE client and BT LAC will agree on the lower value MRU.
- The BT LAC will then proxy on this value towards the Service Provider's LNS.

If the PPPoE client does not obey RFC2516<sup>[9]</sup> and RFC1661<sup>[3]</sup> (which occurs regularly),

one of two circumstances will occur:

- If the PPPoE client and BT LAC do not agree a valid MRU then the BT LAC will proxy a value of 1500 Bytes towards the Service Provider's LNS.
- If the PPPoE client does not send an MRU, but agrees the BT LAC MRU of 1492 Bytes then the BT LAC will proxy that value towards the Customer's LNS for that End User to the Customer.
- If the PPPoE client and BT LAC do not agree a valid MRU then the BT LAC will default to proxying a value of 1500 Bytes towards the Customer's LNS which will advertise this as the IP MTU for that End User to the Customer.
- If the End Users PC is behind the device raising the PPPoE session (for example a routed LAN), then the IP MTU of the PC must be set to 1492 Bytes or lower.

The Customer's LNS should be set up with the correct MTU depending upon the service they wish to offer.

- If they wish to offer just PPPoE then they could set up their LNS with a statically configured IP MTU of 1492 Bytes or lower.
- If they wish to offer just PPPoA then they could set up their LNS with a statically configured IP MTU of 1500 Bytes. However, if an End User chose to use a PPPoE client then packets over 1492 Bytes will be carried over the BT IPstream network but then dropped by the client.

If the Customer wishes to offer a mixed PPPoE and PPPoA service then their LNS should be able to accept the MRU proxied on by the BT LAC and assign that on a per End User basis. However, this will not always be accurate if the PPPoE client does not obey RFC2516<sup>[9]</sup> and RFC1661<sup>[3]</sup> (as detailed in the information above).

## **2.8 Domain Name Options – Domain Nameless and BT Central L2TP passthrough.**

The Domain Nameless Option is not applicable to BT Central L2TP passthrough.

### **3. FURTHER INFORMATION CONTACT POINTS**

For further information about services provided over the BT IPstream L2TP Interface please contact either:

- Your Company's BT account manager
- See the BT web site at [www.bt.com/broadband/](http://www.bt.com/broadband/)

If you have enquiries relating to this document then please contact [help@sinet.bt.com](mailto:help@sinet.bt.com)

#### 4. REFERENCES

[1]	ETS 300 119	Equipment Engineering (EE); European telecommunications standard for equipment practise	1994
[2]	BTNR 2511	Interface of telecomms equipment with a normal 48v negative dc power supply	Latest Issue
[3]	RFC 1661	The Point-to-Point Protocol (PPP)	
[4]	RFC 2661	Layer Two Tunnelling Protocol "L2TP"	
[5]	RFC 1877	PPP Internet Protocol Control Protocol Extensions for Name Server Addresses	
[6]	RFC 1994	PPP Challenge Handshake Authentication Protocol (CHAP)	
[7]	RFC 791	Internet Protocol: DARPA Internet Program Protocol	1981
[8]	SIN 329	BT Broadband IP Products – Interface Specification	
[9]	RFC 2516	A Method for Transmitting PPP Over Ethernet (PPPoE)	
[10]	SIN 347	BT DataStream Office Services, Service Description And Interface Specification	
[11]	SIN 386	BT IPstream Office & BT IPstream Home Products, Service Description and Interface Specification	
[12]	SIN 405	BT IPstream Symmetric	
[13]	SIN 412	622Mb Edgeless L2TP BT Central Product For BT IPstream	
[14]	SIN333	SDH Customer interfaces at the STM-N level (Where N = 1,4,16) Interface Characteristics	Latest Issue

For information on obtaining documents referenced by SINs, please see the documents sources page at <http://www.sinet.bt.com/usenum.htm#docsources>.

#### 5. ACRONYMS

Acronym	Expansions
ADM	Add-drop Multiplexer
ATM	Asynchronous Transfer Mode
BTNR	BT Network Requirement
CC	Corporate Customer
CDN	Call Disconnect Notify
CHAP	Challenge Handshake Authentication Protocol
CPE	Customers' Premises Equipment
CRF	Customer Requirements Form (used for ordering a service)

DARPA	Defence Advanced Research Project Agency
DNS	Domain Name System/Server
ETS	European Telecommunications Standard
ETSI	European Telecommunications Standards Institute
IP	Internet Protocol
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
L2TP	Layer 2 Tunnelling Protocol
LAC	L2TP Access Concentrator
LCP	Link Control Protocol
LNS	L2TP Network Server
LTS	Layer 2 Tunnelling Protocol (L2TP) Tunnel Switch
MTU	Maximum Transmission Unit
NTE	Network Termination Equipment
NTP	Network Termination Point
OAM	Operations And Maintenance
OC3	Optical Carrier 3
PC	Personal Computer
PPP	Point-to-Point Protocol
PPPoE	Point-to-Point Protocol over Ethernet
RAS	Remote Access Server
RFC	Request for Comment
SDH	Synchronous Digital Hierarchy
SIN	Supplier Information Note
SP	Service Provider
STIN	Suppliers' Trial Information Note
STM-1	Synchronous Transport Module Level 1 (155 Mbit/s)
UDP	User Datagram Protocol
VBR	Variable Bit Rate
VC	Virtual Connection
VCI	Virtual Connection Identifier
VP	Virtual Path
VPI	Virtual Path Identifier

## 6. HISTORY

<b>Issue</b>	<b>Date</b>	<b>Details of change</b>
STIN 374 Issue 1.0	8 December 2001	Document first issued as a Suppliers' Trial Information Note.
Issue 1.0	11 May 2001	STIN 374 republished as SIN 374.
Issue 1.1	11 July 2003	Support for PPPoE clarified. Section on terminal equipment approval requirements removed.
Issue 1.2	29 September 2003	Updated due to introduction of IPstream Symmetric and the 622Mbits/sec L2TP passthrough products. Restriction on BT Central L2TP passthrough tunnel endpoints removed.
Issue 1.3	25 April 2005	Reference for description of the ATM layer changed from SIN 306 to SIN 347.
Issue 1.4	15 April 2008	Reference to IPstream S and IPstream 500 have been removed following the withdrawal of the products.

*We would be grateful if you would spend a few minutes to complete an online customer satisfaction form at [www.sinet.bt.com/happy.htm](http://www.sinet.bt.com/happy.htm).*

## **ANNEX A - DIFFERENCES COMPARED TO PREVIOUS ISSUE OF SIN 374**

This document provides a *brief* description of the *major* changes between this issue (1.3) of Suppliers' Information Note 374 and the previous issue. Please refer to the main body of the document for full descriptions of each topic.

<b>DESCRIPTION</b>	<b>REF. SECTION</b>
Reference to IPstream S and IPstream 500 have been removed	1

**Table A. 1 List of major changes from previous issue of SIN 374**

**-END-**