SIN 473

Issue 2.1

December 2014

Suppliers' Information Note

For The BT Network

Broadcast Access: 140MBit/s

Service and Interface Description

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.

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

Enquiries relating to this document should be directed to: sinet.helpdesk@bt.com

© British Telecommunications plc

Registered Office 81 Newgate Street LONDON EC1A 7AJ
Registered in England no.1800000

CONTENTS

FIGURES

TABLES

1 Introduction

This Suppliers Information Note (SIN) describes Openreach's 140MBit/s Broadcast Access service and provides technical information for customers' (also referred to as Communications Providers – CPs), terminal equipment manufacturers and suppliers.

2 Service outline

Openreach's 140MBit/s Broadcast Access service provides optical transportation of compliant, framed signals which are presented electrically to Openreach on coaxial cable. The service conforms with the ITU-T standards G.703 and G.751, but also incorporates specific video framing techniques, of which is defined in section 4.3 of this document.

This is a new access service, which primarily allows the transportation of 140MBit/s Broadcast video circuits over fibre infrastructure, utilising new network terminating equipment (NTE).

The service is limited to a maximum fibre route length of 70Km. Route distance checks are carried out as part of the initial survey work, when an order has been placed.

A main link is limited to a maximum of 35Km radial distance measured between the BT Serving exchanges (intermediate and host exchanges) at each end of a Broadcast Access service.

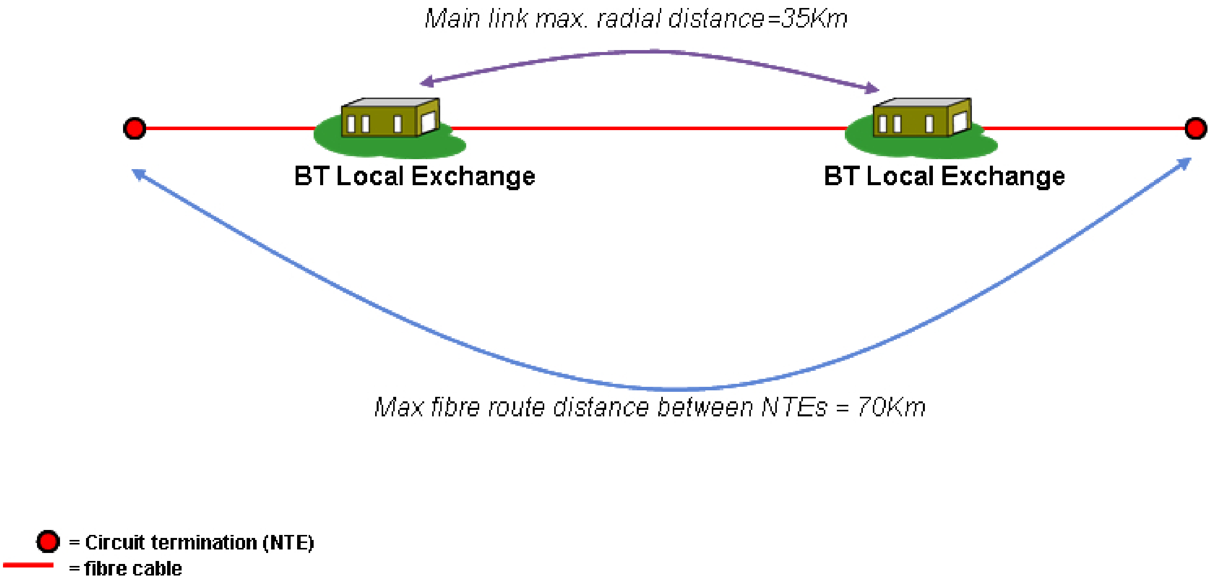


Figure 1. - Service configuration

Please refer to the Broadcast Access product description for details of the circuit options available (http://www.openreach.co.uk/orpg/home/products/ethernetservices/broadcastaccess/broadcastaccess.do).

3 Service availability

140MBit/s Broadcast Access circuits will be available on a point to point basis within the UK.

The product will be available with a choice of unidirectional and bidirectional channel variants. All channels will operate at the same requested circuit bandwidth. These are as follows:

- Single channel unidirectional
- Dual channel unidirectional
- Quad channel unidirectional
- Single channel bidirectional
- **Dual channel bidirectional**

(Note: Combined Dual channel unidirectional and Single channel bidirectional is not available for this bandwidth)

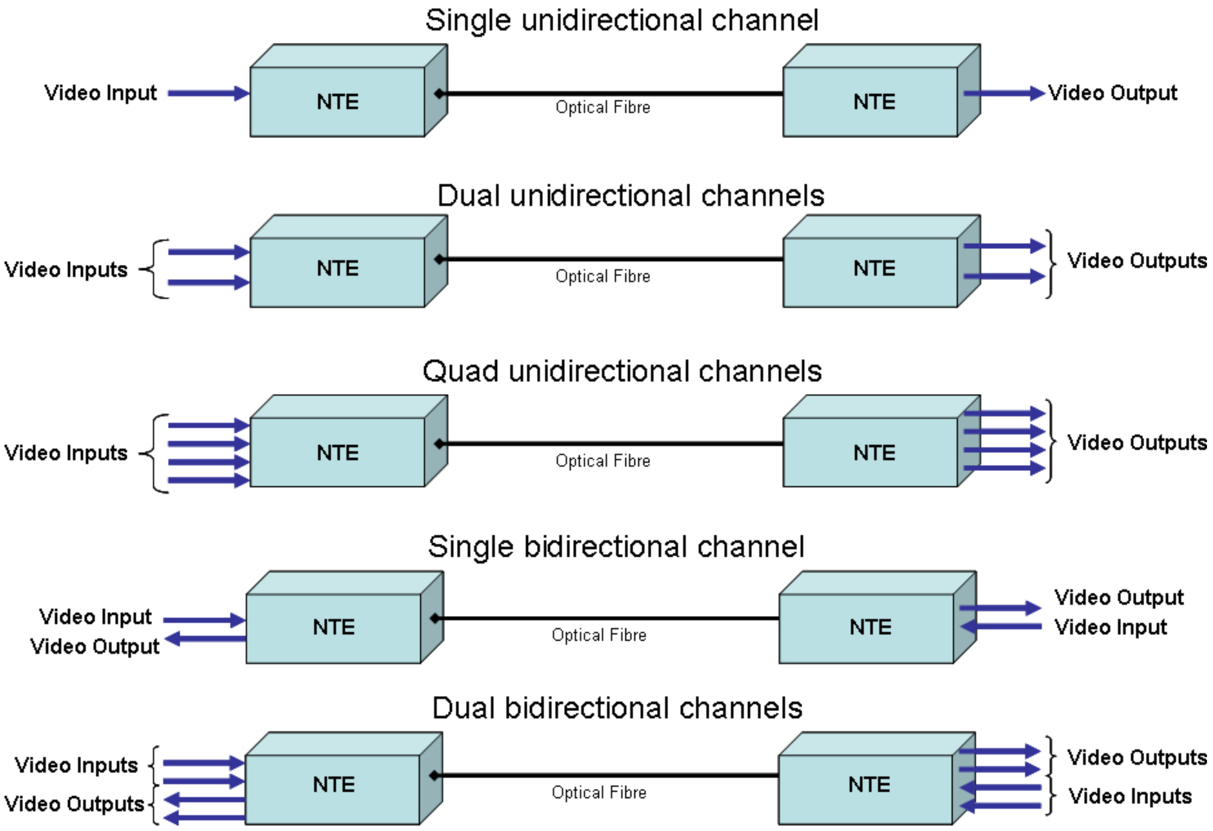


Figure 2. – Channel Variants

4 Technical specification

4.1 Overview

This product allows framed 140MBit/s, ITU-T G.703 compliant circuits to be transported between locations in the UK using BT's telecommunications optical fibre infrastructure. This is achieved by utilising specific Broadcast Access NTEs which perform electrical to optical, and optical to electrical signal conversion at each end of an optical fibre.

4.2 Standards compliance

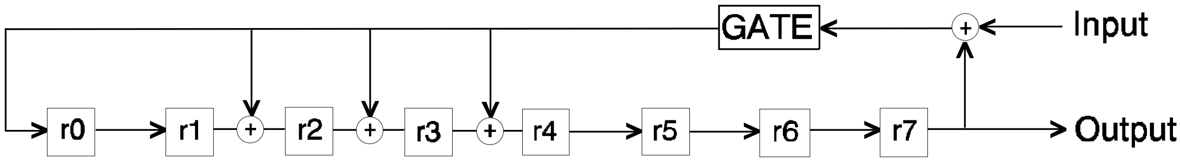
Customer signals presented to the NTE for transportation must comply with ITU-T recommendations G.703 and G.751, as well as the framing structure detailed in section 4.3 of this document. Likewise, the signal *handed back* to the customer after transportation will comply with these requirements.

4.3 Video framing

In addition to the standards defined in section 4.2 of this document, any signals applied to the service must comply with the following framing structure. This text is an extract from a public domain video specification published by BT in November 1993.

4.3.1 140 Mbit/s Frame Structure

The CRC polynomial shall be: $x^8 + x^4 + x^3 + x^2 + 1$ (100011101)



The frame length shall be 2928 bits and the frame shall have the following format:

FAW (12 bits)	**RNU** (4bits)	**Payload** (2912 bits)

The payload in the frame shall have the following format:

10V	**10V**	**A**	**10V**	**10V**	**10V**	**A**	repeated 56 times.

10V = one 10 bit video word; A = one auxiliary bit

This provides 2800 video bits and 112 auxiliary bits in each G751 frame. The auxiliary data structure shall be synchronous with the G751 frame, ie fixed auxiliary bits in each frame shall be assigned to specific auxiliary services. The assignment of bits within the auxiliary subframe shall be an 8 bit CRC followed by 4 blocks allocated as shown below.

C	**C**	**C**	**C**	**C**	**C**	**C**	**C**	+ 4 ×	**1**	**2**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**

The Auxiliary 3 bits shall be used to provide additional data channels at bit rates up to a total of approximately 728 kbit/s, including a low bit rate communication channel between the encoder and decoder for identity and status and either n × 64 kbit/s or 384 kbit/s.

4.3.1.1 Frame Structure and Synchronisation of the Auxiliary Data Channels, A1 & A2

These channels shall use 44 bit frames which are synchronous with the G.751 frame, and an eight-frame multiframe with one stuffing bit per multiframe. The last bit of each of the first seven frames in each multiframe shall be the multiframe alignment/justification control word and the last bit of the eighth frame shall be the stuffing bit.

43 bits	F	43 bits	F	43 bits	F	43 bits	F	43 bits	F	43 bits	F	43 bits	F	43 bits	S

The justification control word shall be either 1110010 if the stuff bit contains valid data or 0001101 if the stuff bit is null data.

4.3.1.2 Error Rate Calculations

Error calculations shall be based on errored G.751 frames. The CRC shall be used to identify frames which are errored. A block of errored frames are considered to be 'consecutive errored frames' if there are no error-free frames between the first errored frame and the last errored frame in the block, for any size of block. Otherwise they are considered to be 'non-consecutive errored frames'. The algorithms which shall be used are defined below.

$$\text{BER} = \frac{\text{Number of errored frames in any 10 second period}}{\text{Total number of bits in that period}}$$

A deferred alarm shall be raised if the BER exceeds 10^{-7} and a prompt alarm shall be raised if the BER exceeds 10^{-5}.

In addition to the BER alarm, two further conditions shall be monitored: consecutive and non-consecutive errored frames. The thresholds at which the alarms trigger shall be selectable from 1 to 1024 errored frames. The method of selection shall be such as is agreed by the SA. The equipment shall be supplied set as follows.

The 'Errored Frames 1' alarm shall raise a deferred alarm for 1 second if there are more than 3 consecutive errored frames.

The 'Errored Frames 1' alarm shall raise a prompt alarm for 1 second if there are more than 20 consecutive errored frames.

The 'Errored Frames 2' alarm shall raise a deferred alarm for 1 second if there are more than 10 non-consecutive errored frames in any 1 second period.

The 'Errored Frames 2' alarm shall raise a prompt alarm for 1 second if there are more than 47 non-consecutive errored frames in any 1 second period.

4.4 Interface presentation

The following interfaces are provided by the NTE:

Interfaces at the NTE	Electrical presentation	Physical presentation
140Mbit/s Input/Output	ITU-T G.703, G751 and proprietary video framing compliant.	Customer connection - 75 Ohm BNC.

Table 1 – Interface presentation

CP connection to/from the NTE will be done directly to designated ports at the rear of the NTE chassis, there will be no patch panel interface. Ports to be used will be allocated when the CP procures the service.

5 Further information

For enquiries concerning connection availability between particular sites and for further "sales and marketing" information about this service please contact your BT Account Manager or Openreach Customer Business Manager.

See http://www.openreach.co.uk

For technical queries regarding the content of this document please submit an email query to the following address: broadcast.solutions@bt.com.

If you have enquiries relating to this document then please email: sinet.helpdesk@bt.com

6 References

[1]	ITU-T Recommendation G.703	Physical/electrical characteristics of hierarchical digital interfaces.
[2]	ITU-T Recommendation G.751	Digital multiplex equipments operating at the third order bit rate of 34 368 kbit/s and the fourth order bit rate of 139 264 kbit/s and using positive justification.

For further information or copies of referenced sources, please see document sources at http://www.btplc.com/sinet/

7 Glossary

BER	Bit error rate.
BNC	Bayonet Neill-Concelman Connector, Industry standard broadcast coaxial connector.
CRC	Cyclic Redundancy Check. An error detection scheme.
FAW	Frame Alignment Word.
ITU-T	International Telecommunication Union – Telecommunication Standardisation sector, Formally known as CCITT.
CP	Communications Provider.
NTE	Network Terminating Equipment.
RNU	Bits reserved for ‘national use’.
SA	Service (level) agreement.
SDV	Serial Digital Video.
SIN	Suppliers' Information Note.

8 History

Issue 1	30 November 2007	Issued
Issue 2	October 2011	DeletedDual channel unidirectional” and “Single channel bidirectional’options from this product bandwidth.
Issue 2.1	December 2014	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/

-END-