SIN 458

Issue 2.2

January 2016

Suppliers' Information Note

For The BT Network

OPENREACH BACKHAUL NETWORK SERVICES (BNS)
Service & Interface Description

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

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1   Introduction

This Suppliers Information Note (SIN) describes the interface provided with Openreach Backhaul Network Services (BNS). Also provided is some additional general information on BNS and on some of the physical aspects of the NTEs currently being deployed for new customer orders.

The Backhaul Network Service product will enable operators to provide a link between a number of LLU co-mingling sites or Base Station Controller sites to one or more CP points of presence, (CP PoP). It will provide a number of high speed, point-to-point uncontended data circuits. The point of aggregation will be able to supply a number of ports that will allow links from LLU co-mingling sites to be aggregated on a shelf.

Any specific technology mentioned in this document is current as of today, however it may be subject to change in the future. Should the specification of the interface be changed, this will be notified by a new issue of this SIN. Openreach reserves the right to adapt technology to deliver BNS as new developments are made. All services are delivered over an uncontended transmission path.

SPECIAL NOTICE
Openreach has formally notified the withdrawal from new supply of all BNS products as from 1st April 2013. Including all Resilience Options (RO1 & RO2) associated with the above products. Existing installed products will continue to be supported until otherwise advised, this includes in life resilience options along with Product bandwidth upgrades/ regrades, shifts and re-arranges.

Please refer to Openreach briefing ETH56/12 (www.openreach.co.uk)

2   Service Overview

2.1   General

The Backhaul Network Service product will enable operators to provide a link between the digital local exchange (DLE) co-mingling site(s) or Base Station Controller sites and their POP via an aggregation point at a location chosen by the customer (but subject to BT design approval). The product is currently designed to deliver both GigE and STM-4 interfaces.

It will provide a high speed, point-to-point single uncontended data circuit.

The point of aggregation will supply 2 x WDM accesses (configured to provide fibre break protection) as a minimum linking to the customer's POP.

The product provides a hub and spoke configuration as shown in Figure 1.
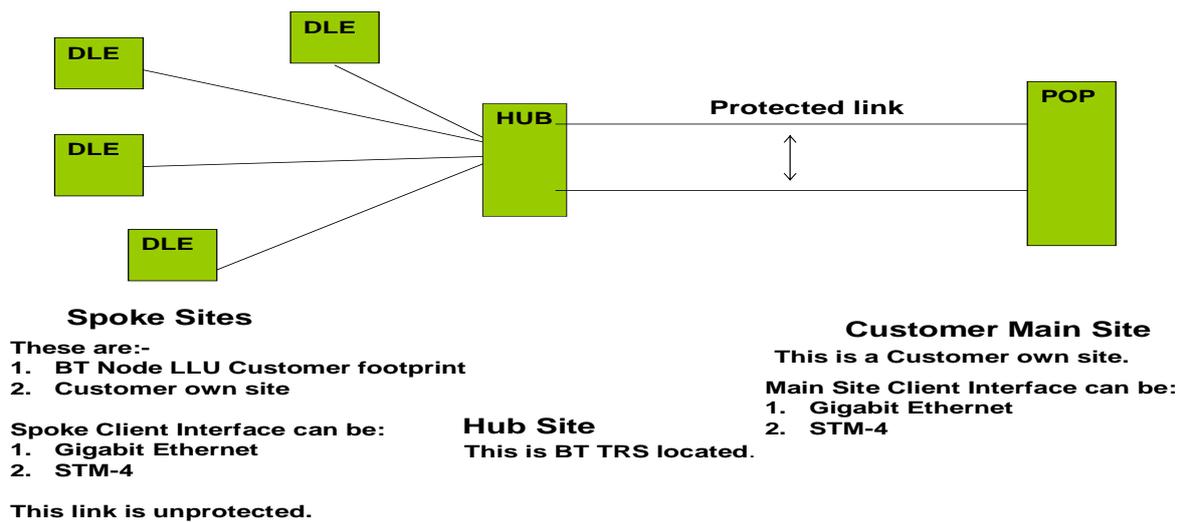
Shows DLE spokes but could include BSC sites.

Figure 1. Hub and Spoke Configuration

2.2 Product Details

Backhaul Network Services (BNS)	
NTE Interface Option	SC or LX
Maximum allowable Radial Distances between sites	25 km (35 km from 19/09/07)
Maximum Route & Range Distances between Hub & Spoke sites	50 km
Maximum Route & Range Distances between Hub & Main Site	60 km
Half / Full Duplex Operation	Full Duplex

Table 1. Technical Summary

Initial service will provide Backhaul from Spoke sites, which may be Customer Co-located footprints in a BT building (LLU area) or Base Station Controller (BSC) sites to a point of aggregation in a BT Transmission Repeater Station. The aggregated service is then transported over WDM payload (ODU2) to a Customer sited Handover at a customer premises.

The ODU hierarchy and bite rates are defined in ITU-T G.709[1].

The BNS product has a limit of 32 spokes to an aggregator site. This is based on the 50 km reach from Hub to Main site and DWDM reach characteristics for wavelengths versus optical degradations.

If additional links are required then these can be served by either seeking to use an alternative hub used by the customer (if within reach) or by the provision of an additional hub with its own infrastructure.

2.3   Product reach constraints

The Hub to Main Site may be up to 50 km route distance and 32 Wavelengths per 10 Gbit/s OPS can be supported.

Where hub to customer sites have a route distance greater than 50 km up to a maximum of 60 km, then a maximum of 8 spokes should be allowed on any structure.

(It is allowed to have multiple structures from the same hub to the same customer site, and these structures may share cables (but not fibres)).

Best engineering practice will be used - if diversity between structures is available, it will be used, but not guaranteed.

There is no minimum number of spokes on a hub. Therefore the actual minimum will be a single spoke on a hub. However the product is designed to deliver multiple spokes from each hub and prices will be higher where small numbers of circuits are provided and hubs are not efficiently utilised.

3 Connectivity
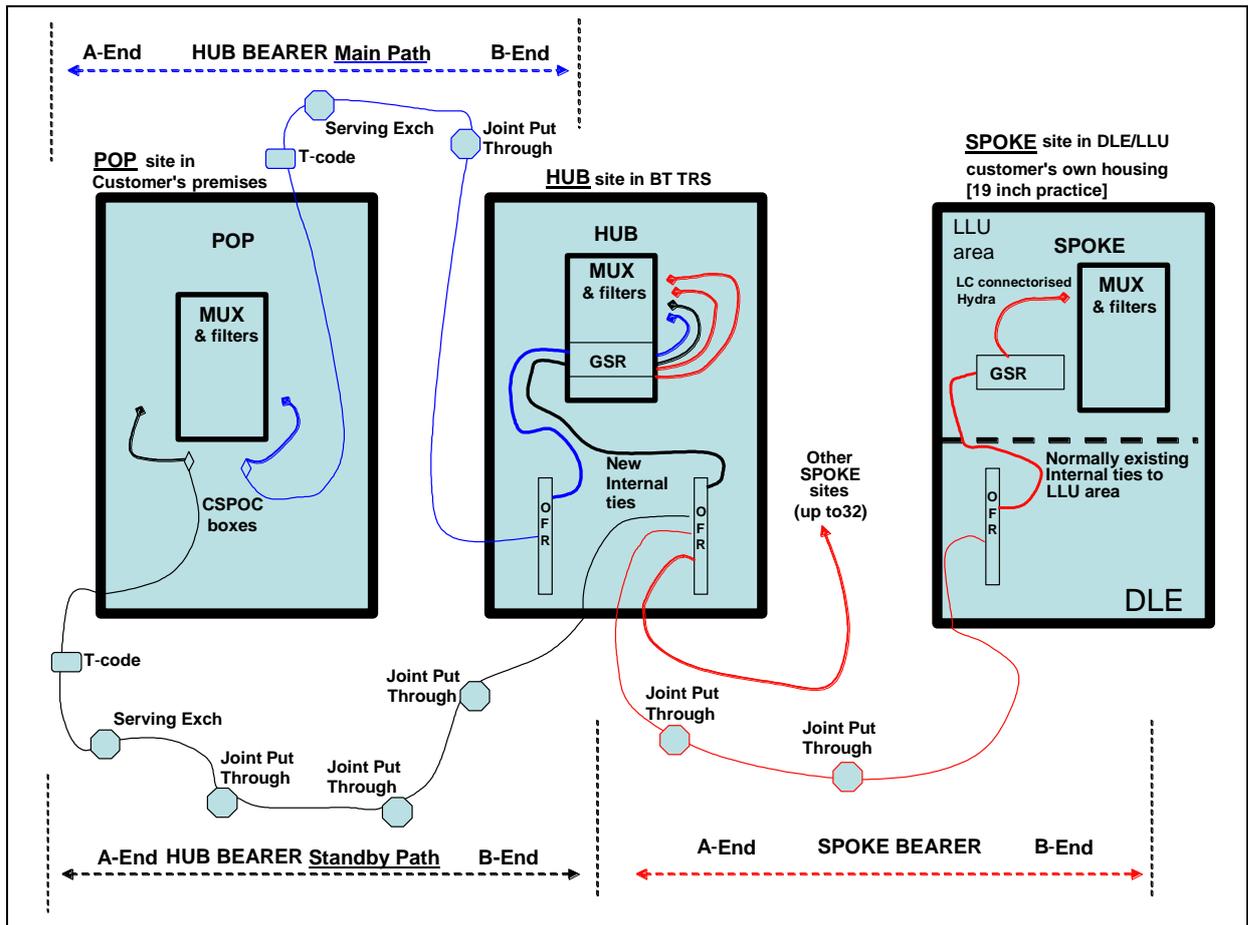
Figure 2. Connectivity for DLE Sites
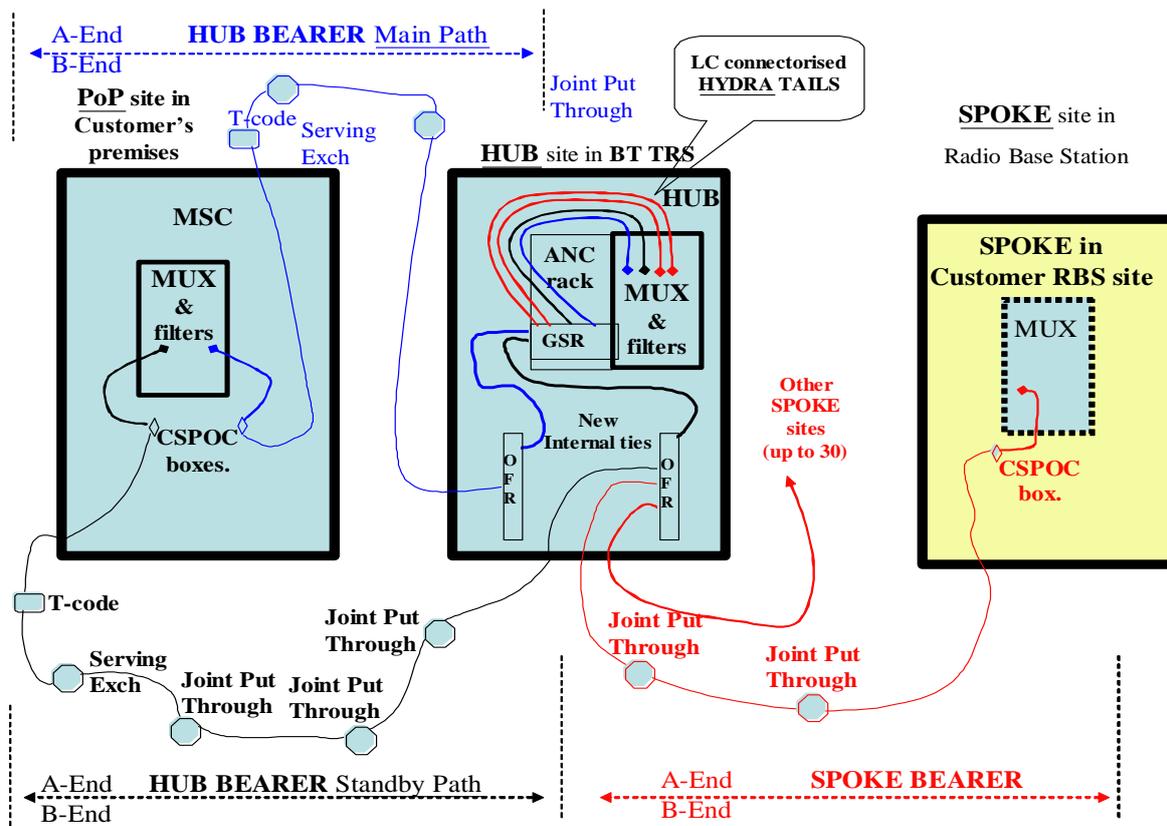
Figure 3. Connectivity for BSC Sites

Note: All optical traffic port connectors on the BT MUX are LC types. Interface to customer at Spoke and Main sites will use normal FC/PC connector panels.

3.1 Spoke Site

In the main, spoke sites will be LLU co-locate areas however, as shown in Figure 3, connectivity to BSC sites is allowed. The customer will provide space within their rack for the element. This will be a housing of 600x300-mm dimension.

Customer interface panels in a cabinet will be employed for client interfaces.

3.2 Hub Site

All diversity for this product is on a reasonable endeavour basis; pinch points are permitted if unavoidable on the link from Hub to Main site. Hub sites can be selected by customers but ultimately BT retains final design authority for the product (Subject to survey).

Each Hub and Spoke configuration is unique to a single Openreach customer.

3.3 Customer Main Site

Customer style delivery on client interface (Customer interface panels in cabinet) will be employed for client interfaces.

Excess construction charges may apply should the customers selected end points beyond normal service delivery parameters. These are under standard terms and conditions for the

BNS product as detailed on the Openreach website, and as referred to in the Openreach Price List.

Each Hub to PoP 10Gbit/s link is provided in a single fibre pair. However the fibre has a back up to provide resilience (see section 6).

One 10Gbit/s link is required for: -

Up to 8 spokes at GbE/STM4 or

Four 2Gbit/s spokes (upgrade path available from 16/10/08)

4   Interface Specifications

The BNS service will utilise Transceivers for:

#1000 Base SX (850 nm Multi Mode) 50 Micrometer presentation. Reach approx 300 metres

#1000 Base LX (1310 nm Single Mode). Reach approx 10 km.

STM-4 (OPT SR1 1310 nm) – Open Reach will insert a 5 dB attenuator in Transmit in order to present equivalent S4.1 customer presentation. Reach approx 20 km. Customer will specify preference on order.

Protocol	Gigabit Ethernet IEEE 802.3z[2]
Line Rate	1.25 Gb/s
Maximum Bit Error Rate	10^{-12}
Power Requirement	DC voltage -50 V
Customer Fibre Connector	FC/PC type
SX Fibre Cable Customer provided	Multi-mode 850 nm, 50/125 micron patch
SX Fibre Maximum Delivery Distance	550 m from NTEs SX port using 50/125 micron patch
LX Fibre Cable Customer provided	Single-mode 1310 nm, 9/125 micron patch
LX Fibre Maximum Delivery Distance	10 km from NTEs LX port
Laser Safety	Class 1 under all conditions as per IEC 825-1

Table 2. Interface Specification

5   Transmission / Network

Equipment is placed at customer "spoke" sites. This may be located in customer supplied racks/cabinets. Note a 600x300 mm cabinet is required. This is configured to provide one GbE or STM-4 interface and to transmit these over a fibre pair to the aggregation site.

An option for a second GbE Interface to be installed at an existing GbE spoke site is available from 16th October 2008 . This is an additional GbE card sitting alongside the

existing GbE service and utilises the same fibre infrastructure from hub to spoke. The provision of a second GbE interface will impact on hub to PoP planning rules. This upgrade option is not available for STM-4 spokes.

It is not possible to mix STM-4 and Gigabit Ethernet interfaces at spoke sites.

The aggregation device uses equipment, to aggregate up to 8 x GbE or 8 x STM-4 signals onto a single 10 Gbit/s OTU2 for transport. This means that each module can support a maximum of four spokes that have two GbE interfaces fitted (i.e. 4 x 2Gbit/s = 8 Gbit/s).

Additional wavelengths can be added as the network expands, up to the 32 for routes below 50 km, and 8 for routes between 50 and 60 km.

6 Hub to Main site Protection mechanism

Protection will be provided against fibre failure on the 10 Gbit/s Optical Physical Section (OPS). Each 10 Gbit/s wavelength will switch independently; however, the protection mechanism employed will result in all Wavelengths in the same OMS switching in unison.

Protection switching is unidirectional with the same signal being transmitted on the two outgoing 10 Gbit/s network interfaces via a 1+1 head-end bridge. Using a 1+1 tail-end selector, each module autonomously selects the best incoming signal with no handshaking required between systems to co ordinate the switch.

Protection switching occurs on hard failures (i.e., LOS) and is non-revertive meaning that the Service does not switch back to the former fibre once optical continuity has been regained. Switching can also be manually forced or inhibited.

Switching criteria are:-

- Loss of Light
- Attenuated light. The switching threshold for this parameter is set at commissioning time.

7 Monitoring

The BNS product will be managed from Network Operations Centre in Edinburgh for 24x7 Network Management. Hubs should be located in Data Communications Network (DCN) enabled exchanges where possible. Where a hub is required in a non-DCN connected exchange connectivity can be provided by means of 2 X MegaStream circuits linking back to a DCN node.

8   Customer Apparatus Design / Installation Advice

8.1   Installation

8.1.1   Main Site

ETSI 600 x 600 mm rack installation.

2 X DC power feeds will be provided by the Customer.

Main Site housing will accommodate up to 4 x MUXes including Customer Interface panels. Each structure will be housed in a discrete rack/cabinet at the customer's main site.

8.1.2   Spoke Site

600 x 300 mm rack installation may be supplied by customer.

DC power feeds will be provided by the Customer.

Connectivity as described in connectivity section.

8.2   Commissioning & Acceptance testing

8.2.1   Commissioning

The commissioning activity includes all the activities required to

- Label all cables and racks not completed at installation phase

- commission and test the provided equipment

- Sign-off by equipment supplier representative carrying out the tests.

Once equipment has been installed and commissioned, BT will provide NOC Engineering staff to operate the Network Management system. No equipment will be left "powered up" unless it is visible to the NOC on the management system.

8.2.2   Acceptance Testing

The Hub site element should be installed commissioned and integrated first.

Fibres should be connected and extended to the line fibres, which have been allocated by BT. Commissioning of Hub site will ensure that DCN capability is available to the Spoke and POP site elements on connection of the mux sections.

Spoke and POP sites should be installed, commissioned and integrated next.

Fibres should be extended to the line fibres, which have been allocated by BT.

Mux sections will be commissioned as part of an overall network readiness test.

The following commissioning tests will be applied: -

1. Elements should undergo a stability test by 'on site' commissioning. The duration and method of this test will be as agreed in the commissioning specification.

2. POP to Hub link will undergo a 24hr soak test for each OTN2 connection between the POP and Hub. . Each OTN2 connection will be tested for duration of 24 hours without recording any error counts.

3. Each Spoke is to be soak tested for each OTN1 connection between the Spoke and Hub. Each OTN1 connection will be tested for duration of 4 hours without recording any error counts.

8.3 Environmental Requirements for equipment.

The BT MUX is designed to operate under the following conditions:

Operating Temperature: 5°C to 50°C (41°F to 122°F)

Short-term Temperature: -5°C to 55°C (23°F to 131°F)

Humidity: between 5% and 85% (non-condensing)

HVAC, cooling available to accommodate the following heat dissipations:

170 W, for the spoke sites.

400 W, for the customer main PoP sites.

8.4 Power Requirements

Customer sites must provide DC power.

Input voltage: -39 VDC to -74.5 VDC

Under-voltage shutdown   -38.5 ±0.5 VDC (-41.0 ±0.5 VDC restart)

Over-voltage shutdown   -75.0±0.5 VDC (-72.0 ±0.5 VDC restart)

Current (max): 5.5 A spoke sites/11.0 A main customer PoP sites.

8.5 Dimensions

The equipment is modular; each module is contained entirely with a single chassis. The chassis dimensions are dependent upon the configured ventilation exhaust option as shown in Table 3.

	Side Exhaust Configuration	Front Exhaust Configuration (ETSI)	Rear Exhaust Configuration (NEBS 2000)
Height	178mm (7.0in) (4RU)	178 mm (7.0in) (4RU)	178 mm (7.0in) (4RU)
Width	445 mm (17.5in)	495 mm (19.5in)	495 mm (19.5in)
Depth	300 mm (11.8in)	300 mm (11.8in)	305 mm (12in)

Table 3. BT Equipment Dimensions

Add 1RU (25 mm, 1in) to the height of the chassis when equipped with the top-mounted fiber management guide.

8.6 Clearances

The equipment chassis requires the following minimum clearances:

152 mm (6in) at the back panel (Rear-exhaust chassis only)

102 mm (4in) at the front panel

No side clearances are required, even for the side-exhaust chassis configuration.

8.7 Weight

When equipped to its maximum configuration (i.e., two power modules, air duct, and fully populated card slot with transceivers and optical filters), the equipment weighs approximately 10.5 kg (23lbs).

9   Further Information

Contacts for further information can be found at http://www.btplc.com/sinet/

Further enquiries concerning the connection availability between particular sites and for further information on the BNS service please contact your company's Account Manager / Team.

10 References

| [1] | ITU-T G.709 | Interfaces for the Optical Transport Network (OTN) | |
| [2] | IEEE 802.3z | IEEE standards for Gigabit Ethernet in the LAN/MAN environment | 1998 |

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

11 **Abbreviations**

BNS	Backhaul Network Services [Openreach]
CP	Communications Provider (Providers of Electronic Communications Services)
BSC	Base Station Controller
BTNR	BT Network Requirement
CPE	Customer Premises Equipment
DCN	Data Communications Network
ETSI	European Telecommunications Standards Institute
CSPOC	Customer Service Point Of Connect
FC/PC	Fibre Connector / Planar Convex
GbE	Gigabit Ethernet
GSR	Gigabit Switch Router
IEEE	Institute of Electronic & Electrical Engineers
HVAC	Heating, Ventilation and Air Conditioning
LAN	Local Area Network
LLU	Local Loop Unbundling
LOS	Loss of Signal
LX	Long Wavelength (1310 nm)
MUX	Multiplexer
NEBS	Network Equipment Building System
NOC	Network Operations Centre
NTE	Network Terminating Equipment
NTP	Network Terminating Point
ODU	Optical Data Unit
OFR	Optical Flexibility Rack
ONT	Optical Network Termination
OPS	Optical Physical Section
PoC	Point of Connect
RU	Rack Unit
SHDS	Short Haul Data Service
SIN	Suppliers' Information Note
STM	Synchronous Transport Mode
SX	Short Wavelength (850 nm)
VLAN	Virtual Local Area network
WDM	Wavelength Division Multiplexing

12 History

Issue	Date	Changes
1.0	March 2006	Document first published.
1.1	June 2006	Product description clarified and editorial changes made.
1.2	August 2006	BSC sites introduced earlier in the product description.
1.3	June 2007	Maximum radial distances between sites changed to allow 35km from 19/09/07.
2.0	September 2008	To include the option for a second GbE card to be installed on an existing GbE spoke
2.1	March 2013	Amended to advise no longer available for new supply w.e.f 1 April 2013
2.2	January 2016	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/

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