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Issue 1.2

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Suppliers' Information Note

For The BT Network

BT International Megastream 155

Service Description

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CONTENTS

1 Introduction

This Suppliers' Information Note (SIN) describes the BT International MegaStream 155 service and provides technical information for terminal equipment (TE) manufacturers and suppliers.

2 Service Outline

BT International MegaStream 155 is an international Synchronous Digital Hierarchy (SDH) point to point leased high speed digital service supporting customer access at 155 520 kbit/s which conforms to ITU-T Recommendation G.707 [1]. The service will support the SDH Virtual Container VC4. The use of the VC4 will depend on customer application, however, if the customer wishes to sub-divide the VC4 into VC12s, VC3s, or ATM etc, then BT recommends that the multiplexing structure given in figures 6-1 to 6-6 of ITU-T recommendation G.707 [1] is adopted. The service is available to the customer via the following interfaces:

- CCITT Recommendation G.703[2] Section 12 (STM-1 electrical)
- ITU-T Recommendation G.957[3] (STM-1 optical)

NOTE: The VC4 for end-to-end usage will be formed out of a payload container of size 149,760 kbit/s and a path overhead of 576 kbit/s.

IMPORTANT NOTE;

The BT International MegaStream 155 Service has been designed to support payloads which, after scrambling, exhibit no sequences of consecutive identical digits in excess of 72 bits, in line with ITU-T Recommendation G.958 [4].

At the time of writing there is a known standards incompatibility issue when applying the Internet Engineering Task Force Specification Request For Comment (RFC) 1619 May 1994 for mapping the Internet Protocol (IP) into the SDH VC4 payload. i.e. lack of scrambling when mapping IP into the SDH VC4 payload. This issue is being addressed within the standards environment and BT anticipates that a new RFC will supersede RFC 1619.

Until such a time that RFC 1619 has been suitably superseded or new mappings provided by the ITU-T or ETSI, the BT MegaStream 155 Service is unable to reliably support applications that apply this mapping to the VC4 payload. The consequence of applying this mapping is the potential failure of the SDH link by either the terminal equipment or the network.

In summary, RFC 1619 for IP to SDH VC4 mapping does not address the use of scrambling. Scrambling is necessary to avoid consecutive identical digits in excess of 72 bits.

For this reason BT recommend suitable scrambling is applied to all SDH VC4 mappings, ref. ITU-T Recommendation G.958.

3 Service Availability

This service will be available from July 1999 where network capacity and correspondent agreement exists with other international PTOs.

For service availability with other countries please contact the International Marketing team as given in section 5.

4 Technical Specification

4.1 Implementing the G.703 Section 12 STM-1 Electrical Interface

The BT International MegaStream 155 service supports customer SDH access which conforms to ITU-T Recommendation G.707 [1].

4.1.1 Physical Presentation

The service is presented in the UK is via a pair of BNC unbalanced 75 Ohm sockets, one for each direction of transmission. The sockets conform to the general requirements of IEC 169-8 [5] with the mating dimensions specified in annex B of BS ISO/IEC 10173 : 1991[6].

4.1.2 Electrical Presentation

The electrical presentation conforms to CCITT Recommendation G.703 [2] section 12. The line code is Code Mark Inversion (CMI). The recommended configuration of the SDH Section and Path Overheads is given in Annex A.

4.2 Implementing the G.957 STM-1 Optical Interface

The BT International MegaStream 155 service supports customer SDH access which conforms to ITU-T Recommendation G.707 [1].

4.2.1 Service Presentation

The service is presented in the UK as an optical Single-Mode fibre connection conforming to ITU-T Recommendation G.957 [3] for SDH optical requirements. The optical fibre presentation at the UNI is conformant to BS EN 60825-1 [7] and BS EN 60825-2 [8] as a Class 1 Laser Product.

The physical presentation of the service is via a FC type optical connector conforming to BS EN 186110:1994 [9]. The connector is Physical Contact (PC) polished. Line coding is 'Non Return to Zero' (NRZ) as specified in ITU-T Recommendation G.957 [3].

The signal transmitted from the BT NTE is derived from a 1310nm wavelength long haul SDH class (specified as L-1.1 in ITU-T Recommendation G.957 [3]) optical transmitter. The optical signal has been attenuated by 10dB to provide a transmitted power range of between -10dBm and -15dBm (The 10dB attenuator is provided by BT on the NTE transmitter to ensure that the Customers CPE receiver is not saturated). The NTE receiver power range is between -10dBm and -34dBm.

The recommended configuration of the SDH Section and Path Overheads is given in Annex A. Figure 1 below highlights the difference between SDH Sections and SDH Paths.

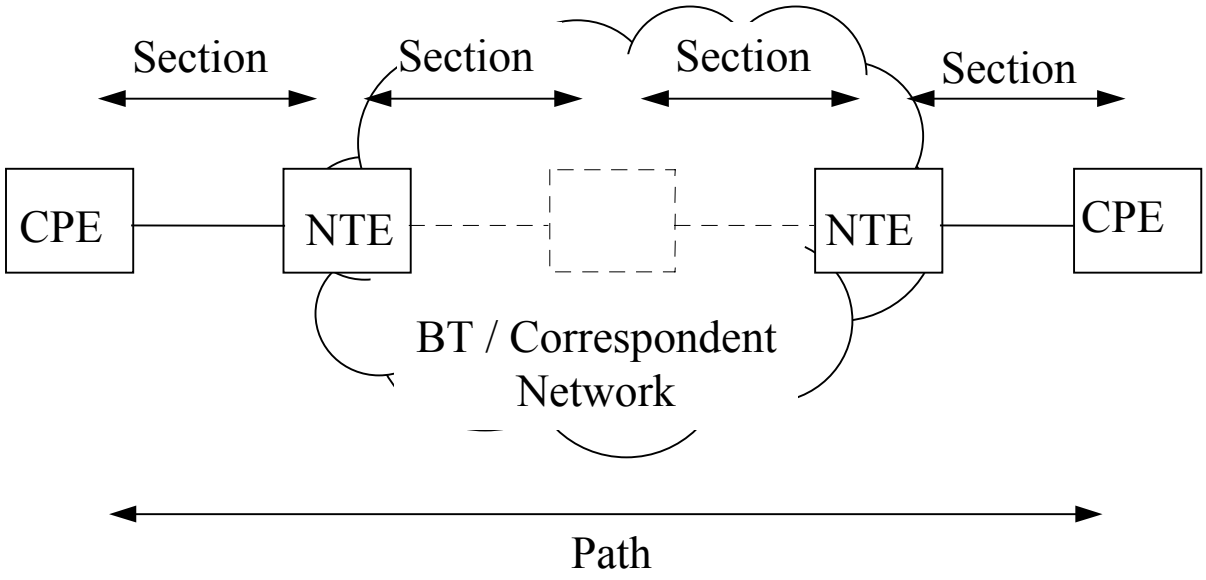

Figure 1 - Comparison of SDH Path vs. Section

4.3 Connection Characteristics

4.3.1 Performance Information

The performance of the BT MegaStream 155 service will be in accordance with ITU-T Recommendation G.826 [10]. The actual performance will of course vary depending on the circuit length and the number of SDH elements involved in the end-to-end circuit.

4.3.2 Jitter

4.3.2.1 From the Terminal to the Network

The BT network will accept jitter in accordance with ITU-T Recommendation G.825 [11]. See notes 1 & 2.

4.3.2.2 From the Network to the Terminal

The level of Jitter from the network to the terminal will be in accordance with ITU-T Recommendation G.825 [11]. See notes 1 & 2.

Note 1 - Pointer Adjustment

A characteristic of SDH is Pointer Adjustment which is where clocks get slightly out of alignment and the Administrative Unit (AU) pointer needs to be adjusted to correctly point to the Virtual Container start point. To minimise this characteristic, both for VC4 and lower rates such as VC12, it is important that both the network and the Customer's terminal equipment clocks are synchronised together.

Note 2 - Network Synchronisation

Under normal SDH network synchronisation conditions the 155,520 kbit/s signal transmitted towards the private network will be frequency locked to the SDH NTE synchronisation clock. This in turn will normally be frequency locked to a signal traceable to BT's ITU-T Recommendation G.811 [12] and ETSI ETS 300 462-6 [13] compliant Primary Reference Clock (PRC).

4.4 Network Terminating Equipment (NTE) Power Supply Requirements

The NTE is locally powered and will require either a 50Hz AC or a –50V DC supply. It will be mounted in accordance with standard BT practices in agreement with the customer.

Where the NTE is to be powered by a customer provided -50Volts, the NTE will be supplied with a 'wires only' power connection lead. As power supplies can vary slightly in output voltage and characteristics, the NTE will function with customer provided power supplies that are in accordance with the British Telecom Network Requirement, (BTNR) 2511[14].

NOTE: Customer provided power supplies for connection to this service shall conform with relevant safety standards.

5 Further Information Contact Point

Please contact either:

- Your Company's BT account manager.
- For business customers, BT sales on 0800 800152 for product and service information, sales and rental enquiries.

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

6 Glossary

AU	Administrative Unit
BTNR	British Telecom Network Requirement
CMI	Coded Mark Inversion
CCITT	Now known as ITU-T
CTR	Common Technical Regulation
ETS	European Telecommunication Standard
ETSI	European Telecommunications Standards Institute
ITU-T	International Telecommunication Union For Telecommunications (formerly CCITT)
NTE	Network Terminating Equipment
PRC	Primary Reference Clock
RFC	Request For Comment
SDH	Synchronous Digital Hierarchy
SIN	Suppliers' Information Note
TBR	Technical Basis for Regulation
TE	Terminal Equipment
UNI	User Network Interface
VC	Virtual Container

7 References

[1]	ITU-T G.707	Network node interface for the Synchronous Digital Hierarchy (SDH)	1996
[2]	ITU-T G.703	Physical/Electrical characteristics of hierarchical digital interfaces	1991
[3]	ITU-T G.957	Optical interfaces for equipment's and systems relating to the synchronous digital hierarchy	1995
[4]	ITU-T G.958	Digital line systems based on the synchronous digital hierarchy for use on optical fibre cables.	1994
[5]	IEC 169-8	Radio-frequency connectors - Part 8 : R.F. coaxial connectors with inner diameter of outer conductor 6.5 mm (0.256 in) with bayonet lock - Characteristic impedance 50 ohms (Type BNC)	1978
[6]	BS ISO/IEC 10173	Integrated Services Digital Network (ISDN) Primary Access Connector at Reference Points S and T	1991
[7]	BS EN 60825-1	Safety of Laser Products Part 1 Equipment classification	1994
[8]	BS EN 60825-2	Safety of Laser Products Part 2 Safety of Optical fibre communications systems	1995
[9]	BS EN 186110	Sectional Specification. Connector sets for optical fibre and cables Type FC	1994
[10]	ITU-T G.826	Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate.	
[11]	ITU-T G.825	The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)	1993
[12]	ITU-T G.811	Timing requirements at the outputs of reference clocks and network nodes suitable for plesiochronous operation of international digital links	1996
[13]	ETS 300 462-6	Transmission and Multiplexing (TM); Generic requirements for synchronisation networks; Part 6: Timing characteristics of primary reference clocks	1997
[14]	BTNR 2511	Interface of telecomms equipment with a nominal 48v negative dc power supply	

For further information or copies of referenced sources, please see document sources at http://www.sinet.bt.com/usenum.htm#docsources

8 History

Issue 1	June 1999	First Issued
Issue 1.1	September 2001	Editorial Format Changes Only
Issue 1.2	September 2003	Approval Requirements statement removed, information available via SINet Useful Contacts page.

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Annex A - SDH Overhead Configuration Details

This annex provides recommendations for the setting of the SDH Overhead Fields.

A.1 Section Overhead

The parameters below can be found in Figure 9.7 of G.707.

Field	Terminal to Network	Network to Terminal
A1	As per G.707	As per G.707
J0	This field should be completed as per table 4 of G707. See note 1 for completion of 'X' bits. [X = value don't care bit]	This table will be completed as per table 4 of G.707. Completion of the 'X' bits can be done by local agreement. See note 1. [X = value don't care bit]
B1	As per G.707	As per G.707
E1	The network will ignore this field	The terminal should ignore this field
F1	The network will ignore this field	The terminal should ignore this field
D1-D12	The network will ignore these fields	The terminal should ignore these fields
B2	As per G.707	As per G.707
K1	The network will ignore this field	The terminal should ignore this field
K2	The network will ignore this field	The terminal should ignore this field
S1	The network will ignore this field	The terminal should ignore this field
M1	As per G.707	As per G.707
E2	The network will ignore this field	The terminal should ignore this field
All other fields are reserved.		

Note. 1 - The format for this field is currently the subject of discussion within the standards environment and once completed will establish how this field should be used. For the time being, customers may use their own format in this field.

A.2 Path Overhead

It is strongly recommended that Path Trace (see note 2 below) and the Signal Label (see note 3 below) information be used as defined in G.707. Customers may also use the Path Bit Interleaved Parity (BIP): B3 byte for end-to-end path error monitoring. It also recommended that other path overhead information be used as described in G.707.

Note. 2 - The format for this field is currently the subject of discussion within the standards environment and once completed will establish how this field should be used. For the time being, customers may use their own format in this field. It is strongly recommended that for maintenance purposes, a meaningful trace identifier is exchanged between terminals, as opposed to Null Bytes.

Note 3 – It is important to note that the unequipped status of the Signal Label is used as a sub-network connection protection switch criteria within BT. In accordance with ITU standards an unequipped signal constitutes a signal fail condition and will effectively lock the protection selector when presented to both sub-network protection terminations. As a consequence a VC4 will be rendered unprotected if it's signal label is set to 'Unequipped' (i.e. the C2 byte = 0).