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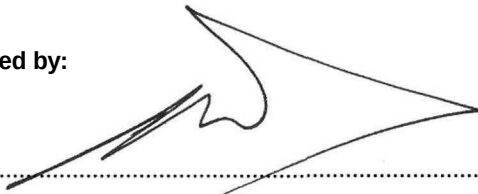
Business Process Document

Primary PCM Multiplex Equipment (formerly RT/E/PS/00026)

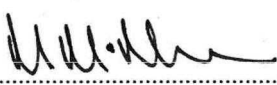
E Endorsement & Authorisation

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Issue record

Issue	Date	Comments
1	February 2002	First Issue
2	April 2006	Document re-numbered as part of standards framework process. Railtrack changed to Network Rail.

Implementation

This standard shall be implemented from April 2006.

Compliance

This Network Rail Product Specification is mandatory and must be complied with by Network Rail and its Contractors from April 2006.

When this Specification is implemented, it is permissible for all projects, which have formally completed GRIP Level 4, to continue to comply with the Issue of any relevant Network Rail Standards current when GRIP Level 4 was reached and not to comply with requirements contained herein unless the designated Head of Telecoms has stipulated otherwise in the accompanying Briefing Note.

Where the Head of Telecoms has specified that all projects will comply with the requirements, specific authority not to comply can be sought in the usual manner using the appropriate non-compliance authority processes described in Network Rail Standard, [NR/SP/STP/045](#) Managing the Process for Non-compliance Authority (formerly RT/LS/P/045).

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1 Purpose

This Product Specification states the minimum requirements for Primary PCM Multiplex Equipment forming part of telecommunications systems providing services for operational railway and business applications.

2 Scope

This Product Specification states the requirements for supply of Primary PCM Multiplex Equipment. It shall be used by persons responsible for the specification of transmission equipment.

3 Reference documentation

NR/PS/TEL/00015 (RT/E/PS/00015)	Unit Twin Copper Telecommunications Cable
NR/SP/TEL/30002 (RT/E/S/30002)	Signal Post Telephone Concentrator System
NR/SP/TEL/30003 (RT/E/S/30003)	The Performance of Telecommunications Equipment under Conditions of Electrical Interference
NR/CS/ACC/029 (RT/LS/P/029)	Product Acceptance
BS 6305	Specification for general requirements for apparatus for connection to the British Telecommunications public switched telephone network
BS 6450	Private branch exchanges for connection to public switched telephone networks run by certain public telecommunications operators
BS 7671	Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition
EN 50121-1	Railway applications – Electromagnetic compatibility Part 1: General
EN 50121-4	Railway applications – Electromagnetic compatibility Part 4: Emission and immunity of the signalling and telecommunications apparatus
EN 60950	Specification for safety of information technology equipment, including electrical business equipment

ETS 300 019-1-3	Environmental conditions and environmental tests for telecommunications equipment Part 1-3: Classification of environmental conditions Stationary use at weather protected locations
ETS 300 119-4	European telecommunication standard for equipment practice Part 4: Engineering requirements for subracks in miscellaneous racks and cabinets
ITU-T G.703	Physical/electrical characteristics of hierarchical digital interfaces
ITU-T G.704	Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44736 kbit/s hierarchical levels
ITU-T G.711	Pulse code modulation (PCM) of voice frequencies
ITU-T G.712	Transmission performance characteristics of Pulse Code Modulation channels
ITU-T G.732	Characteristics of primary PCM multiplex equipment operating at 2048 kbit/s
ITU-T G.796	Characteristics of a 64kbit/s cross-connect equipment with 2048kbit/s access ports
ITU-T G.826	Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate
ITU-T M.3010	Principles for a Telecommunications management network
ITU-T M.3400	TMN Management Functions
ITU-T V.11	Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s
ITU-T V.24	List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
ITU-T V.28	Electrical characteristics for unbalanced double-current interchange circuits
ITU-T X.24	List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks

ITU-T X.27

Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s

4 Definitions

Equipment

Primary PCM multiplex equipment configured in terminal, drop & insert or digital cross-connect.

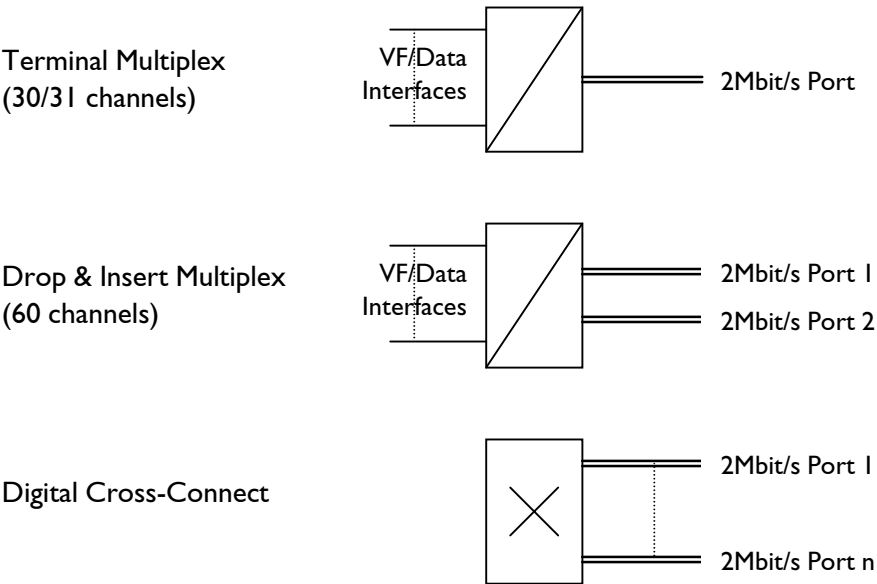
5 Configurations

5.1

This Product Specification details the requirements of equipment capable of assembling up to 30 voice frequency channels, encoded in accordance with ITU-T recommendation G.711 A-Law, or 31 x 64 kbit/s digital channels, into one or more frame formats in accordance with ITU-T recommendation G.704 at an aggregate bit rate of 2 Mbit/s.

5.2

The following configurations are considered:



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6 General Characteristics

6.1 Safety

6.1.1

The equipment shall comply with all legislative requirements.

6.1.2

The equipment shall be electrically safe for users and maintainers. Conformance with BS EN 60950 & BS 7671 is acceptable as evidence of this.

6.1.3

All aspects of the procedures for handling, preparation and testing shall meet the requirements of the Health & Safety at Work Act 1974.

6.2 Performance Requirements

6.2.1

The electrical characteristics of 2 Mbit/s interfaces from the equipment shall be in accordance with ITU-T recommendation G.703.

6.2.2

Operation of the equipment shall be in accordance with ITU-T recommendations G.732 and G.796.

6.2.3

Performance of the equipment shall be in accordance with ITU-T recommendation G.712 and [NR/SP/TEL/30003](#) (formerly RT/E/S/30003).

6.2.4

There shall be no restriction on the connection of a circuit on a tributary interface unit to a timeslot in a 2Mbit/s port.

6.2.5

The equipment shall be able to accommodate a combination of VF and digital tributary interface units. The requirements for individual tributary interface units are specified in Appendix A.

6.2.6

Operation of a particular circuit on one tributary interface unit shall not affect or be affected by any other circuit/tributary interface unit. The

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performance of any tributary interface unit shall not be degraded by bit pattern sensitivity.

6.2.7

Except in the case of the Digital Cross Connect, an on-board ringing generator shall be provided in accordance with BS 6305 clause C.3 (earth or battery backed).

6.2.8

Where operating in the drop & insert mode, the equipment shall implement automatic service restoration that functions in less than 30 seconds without operator intervention during failure of a local or remote 2Mbit/s path.

6.2.9

The equipment shall be suitable for use in environmental conditions complying with ETS 300 019-1-3 for operation in temperature controlled (class 3.1) locations. Temperature controlled environments include rooms within purpose built buildings (e.g. signal boxes), equipment cabins, and Trackside Equipment Housings.

6.2.10

The equipment subrack shall comply with ETS 300 119-4. The equipment will be installed in either miscellaneous racks within rooms, or within Trackside Equipment Housings.

6.2.11

The equipment shall operate from a nominal 50V d.c. station battery, (within the range 43.2V to 57V), positive terminal earthed.

6.2.12

The MTBF of the equipment (excluding tributary interfaces) shall exceed 80,000 hours. The supplier shall provide full information on the failure rate of replaceable units appropriate to the intended environment.

6.2.13

The operational lifetime shall be a minimum of 10 years.