

|       |                 |
|-------|-----------------|
| Ref   | NR/SP/TEL/30002 |
| Issue | 4               |
| Date  | April 2006      |

# Business Process Document

## Signal Box Telephone Concentrator System (formerly RT/E/S/30002)

### Endorsement & Authorisation

Endorsed by:



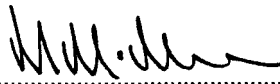
S. Hailes, Head of Telecoms Engineering

Authorised by:



A. McNaughton, Chief Engineer

Accepted for issue by:



M McManus, National Standards Manager

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of the Standard Owner.

© Copyright 2006 Network Rail

Uncontrolled copy once printed from its electronic source.

Published & Issued by: Network Rail 40 Melton Street, London NW1 2EE



## Issue record

| Issue | Date          | Comments                                                                                                                                                                                                                                                 |
|-------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | January 1997  | First Issue                                                                                                                                                                                                                                              |
| 2     | August 2001   | All handsets to be provided with 'Press to Talk' facility. Minor amendments.                                                                                                                                                                             |
| 3     | December 2001 | Reliability targets added to certain safety related requirements. Document revised in product specification format. New requirements added, inappropriate requirements removed and all requirements categorised. (Note: amendments not marked in margin) |
| 4     | April 2006    | Document re-numbered as part of standards framework process. Railtrack changed to Network Rail.                                                                                                                                                          |

## Implementation

The requirements of this specification shall be enforced from 1<sup>st</sup> April 2006 for systems introduced into service after this date. No retrospective action is required unless by virtue of other standards or regulation.

## Compliance

This Network Rail Specification is mandatory and must be complied with by Network Rail and it's 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).

## Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

## Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document will be available to Network Rail employees on request to the Document Controller and to other organisations from IHS Technical Indexes (01344 404409)

|        |                        |
|--------|------------------------|
| Ref:   | <b>NR/SP/TEL/30002</b> |
| Issue: | 4                      |
| Date:  | April 2006             |

## Contents

|    |                                                   |    |
|----|---------------------------------------------------|----|
| 1  | Purpose                                           | 4  |
| 2  | Scope                                             | 4  |
| 3  | Reference documentation                           | 4  |
| 4  | Definitions                                       | 5  |
| 5  | Signal Box Telephone Concentrator System Overview | 7  |
| 6  | Operator's Equipment Functional Requirements      | 8  |
| 7  | Line Interface Functional Requirements            | 14 |
| 8  | System Management Functional Requirements         | 19 |
| 9  | Design and Construction Requirements              | 22 |
| 10 | Approvals                                         | 24 |

## 1 Purpose

This document defines the requirements to be met by a signal box telephone concentrator system.

## 2 Scope

These requirements apply to new concentrator systems for use in Network Rail controlled signal boxes and to subsequent modification of these systems. Each requirement statement has been classified and falls into one of the following three categories: (I)

- Mandatory (indicated by '(M)' at the end of the paragraph). Compliance with these requirements is mandatory.
- Desirable (indicated by '(D)' at the end of the paragraph). These are desirable requirements. Where a group of desirable statements are all needed to satisfy a general requirement '(D\*)' will be indicated at the end of the paragraph.
- Information (indicated by '(I)' at the end of the paragraph). These are statements intended to provide explanatory notes.

## 3 Reference documentation

Reference is made in this Specification to the following publications. (I)

|                                 |                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GM/RC1500                       | Code of Practice for EMC between the Railway and its Neighbourhood                                                                                          |
| <a href="#">NR/CS/ACC/029</a>   | Product Acceptance                                                                                                                                          |
| <a href="#">(RT/LS/P/029)</a>   |                                                                                                                                                             |
| <a href="#">NR/SP/TEL/30003</a> | Performance of telecommunications equipment under conditions of Electrical interference                                                                     |
| <a href="#">(RT/E/S/30003)</a>  |                                                                                                                                                             |
| BR967                           | Railway Signalling Apparatus: Environmental Conditions (Jan 1973)                                                                                           |
| BS 6305: 1992                   | Specification for general requirements for apparatus for correction to public switched telephone networks run by certain public telecommunication operators |
| BS 6450                         | Private branch exchanges for connection to public switched telephone networks run by certain public telecommunication operators                             |
| BS EN 41003: 1993               | Particular safety requirements for equipment to be connected to telecommunication network                                                                   |
| BS EN 60950: 1993               | including amendment A1 and A2 (also numbered as BS 7002:1992)                                                                                               |
| BS EN 60529                     | Specification for degrees of protection provided by enclosures (IP code)                                                                                    |
| ETS 300 119-2: 1994             | Engineering requirements for racks and cabinets                                                                                                             |
|                                 | Health and Safety at Work Act 1974                                                                                                                          |
|                                 | The Telecommunications Act 1984                                                                                                                             |

## 4 Definitions

### Call in Progress

An established call between an operator and a caller.

### Caller

Person attempting to communicate with an operator using a telephone instrument connected to the system. This definition also includes a person answering a call from an operator.

### Concentrator

A voice communication system that 'concentrates' a number of a telephone extensions to a single handset. This definition covers the MMI, control equipment and line termination equipment provided for a signal box but excludes inter-nodal links, remote telephones, associated circuits and power supplies.

### Control Centre

A location from which the operation of the railway and/or its infrastructure is controlled, but excluding signalling centres. Examples include ECRs and Network Rail Integrated Control Centres.

### Distributed System

A system including remote LTUs

### Handset

Instrument used by the operator for voice communication. This definition includes fixed headsets.

### Hold

A circuit condition whereby the speech of an answered call on an automatic exchange circuit is disconnected but the call remains indicated to the operator for reconnection of speech when required.

### Incoming Call

An attempted call originated by a caller.

### Industry standard telecom circuit

A telecom circuit with no safety integrity and generally available from a PTO.

### Inter-nodal Link

An industry standard telecom circuit used in distributed systems for linking remote LTUs

### Key

A key, button or other manually operated switch (including a 'virtual' button on a touchscreen)

### Key and Lamp

A type of MMI with mechanically operated keys and associated lamps

### **Key Pad**

The group of buttons used for dialling. These may be independently located, be part of the handset, or accessible through a VDU.

### **Line Termination Unit**

A unit containing line termination equipment

### **Lineside Telephone**

A telephone instrument located at the trackside and used in the operation of the railway.

### **Man Machine Interface**

An interactive display on which keys and associated indicators are presented to set up an outgoing call or accept an incoming call. MMIs may typically be of 'key and lamp', 'touch screen', 'mouse' or 'rollerball' operation.

### **Node**

See Line Termination Unit

### **Operator**

Person authorised to operate the MMI (e.g. a signaller).

### **Park**

A circuit condition applied to faulty CB lines to prevent repetitive incoming calls when no caller is present. Circuits may be automatically or manually parked.

### **Remote Node**

A line termination unit located remotely from the system control equipment and linked by industry standard telecom circuits.

### **Signal Box**

A location from which signallers control trains. This definition includes signalling centres and NMCs.

### **Signal Post Telephone**

A lineside telephone located on or near a signal and used primarily by train drivers for communication with the signaller.

### **SPT Concentrator**

Common name for a signal box telephone concentrator

### **(the) System**

A signal box concentrator system including MMI, control equipment, line termination equipment, inter-nodal links (where required), remote telephones and associated circuits but excluding power supplies.

### **Touch screen**

A software controlled MMI with keys presented on a VDU.

## Abbreviations

|       |                                                             |
|-------|-------------------------------------------------------------|
| AHB   | Automatic Half Barrier Level Crossing                       |
| AOCR  | Automatic Open Level Crossing, Remotely monitored           |
| BABT  | British Approved Board for Telecommunications               |
| BR    | British Railways Board Specification                        |
| BS    | British Standard                                            |
| CB    | Central Battery                                             |
| DC    | Direct Current                                              |
| DTMF  | Dual Tone Multi Frequency                                   |
| E & M | Earth and Mark                                              |
| ETD   | Extended Trunk Dialling (The Railway internal phone system) |
| ITU   | International Telecommunication Union                       |
| LTU   | Line Termination Unit                                       |
| MMI   | Man Machine Interface                                       |
| MTBF  | Mean Time Between Failures                                  |
| NMC   | Network Management Centre                                   |
| NRO   | No Ring Out                                                 |
| NU    | Number Unobtainable Tone                                    |
| PABX  | Private Automatic Branch Exchange                           |
| PAX   | Private Automatic Exchange                                  |
| PMBX  | Private Manual Branch Exchange                              |
| PSTN  | Public Switched Telephone Network                           |
| PTO   | Public Telecoms Operator                                    |
| REN   | Ringer Equivalent Number                                    |
| SSDC  | Signalling Systems Direct Current                           |
| VDU   | Visual Display Unit                                         |

## 5 Signal Box Telephone Concentrator System Overview

### 5.1

Telephone systems provided at signal boxes are primarily used for secure direct communication between an operator and lineside user. The majority of lineside circuits are connected to Signal Post Telephones (SPTs) and thus these telephone systems are often known as SPT concentrators. These systems also cater for other direct lines and exchange circuits. (I)

### 5.2

Signal box (SB) concentrators are used for communication concerning the operational railway and can include the authorisation of a train to pass a signal at danger. As a system failure has the potential to contribute to a multi-fatality incident, SB concentrators are classed as safety related systems. (I)

### 5.3

A SB concentrator system generally comprises of line interfaces, control equipment and a man machine interface (MMI). The MMI consists of keys, line

and alarm indications, key pad for dialling and handset (or headset). The MMI display comprises of keys provided to initiate an outgoing call or answer incoming calls, complete with associated line indicators; the key pad may be incorporated into this display or be part of the handset. (I)

## 5.4

The MMI may be situated within the same enclosure as the central control equipment and line interfaces, or mounted separately. The line interfaces provide the connections to the telephones and the control equipment manages the call routing and functionality. Line interfaces may also be located remotely to provide a local termination point (or node) for telephone circuits without the need for transmission systems. Nodes are linked to the central control equipment (and each other) by industry standard telecom circuits. These systems are generally known as distributed or networked concentrator systems. (I).

## 6 Operator's Equipment Functional Requirements

### 6.1 Introduction

This section describes the functional requirements for the operator's equipment. It covers the functionality to be provided by the SB concentrator control and MMI equipment. (I)

### 6.2 Incoming Call Visual Indication

#### 6.2.1

When an incoming call is received the unique identity of the associated circuit shall be clearly presented at the MMI until answered by the operator or terminated by the caller. Once answered, the unique identity of the circuit shall remain clearly presented at the MMI for the duration of the call. The mean time between failure of this operational safety requirement shall be better than 10 years per concentrator. (M)

#### 6.2.2

The mean time between failure of erroneous indication of an incoming call, when no call has been initiated or change of line circuit state has occurred, shall be better than 50 years per concentrator. (M)

#### 6.2.3

The mean time between failure of an unrevealed cross connection occurring shall be better than 100 years per concentrator. (M)