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Business Process Document

Office Telephone System Installations (formerly RT/E/C/30037)

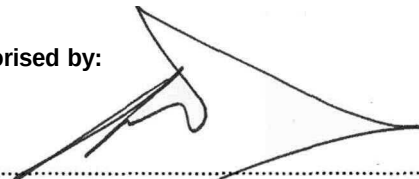
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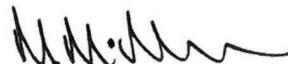
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1 Purpose

This Code of Practice provides information on details to be considered when designing, configuring and installing telephone systems in Network Rail offices. Its purpose is to provide comprehensive advice on all aspects of telephone system design and installation and to recommend a standardised approach from initial work requests to complete telephone system and peripheral equipment installations.

2 Scope

This code of practice applies to all telecoms engineering staff and project managers involved in the installation of office telephone systems.

Due to Global Crossing entering chapter 11 status in the USA and the end of the exclusivity of supply of telecoms equipment between Network Rail and Global Crossing in 2002, Network Rail are now in a position to purchase telephone switches from various sources. The present need to connect to the Global Crossing network limits the choice of switches available as they need to be approved by Global Crossing. The present switch of choice with the most recent version of software approved for connection to the Global Crossing network is the Ericsson MD110. Network Rail purchase, on average, 3 to 5 telephone switches per year and there are three known suppliers of MD110's with direct links to Ericsson that can be used. The present supplier for this equipment is Damovo UK Ltd.

Maintenance for new switches is undergoing a competitive tender action due for delivery in April 2003 at which time a 1-year maintenance contract will be awarded to the successful company.

In terms of the Fixed Telecom Network, FTN, switches shall be purchased by competitive tender. Existing Network Rail switches are QSIG compatible, therefore interconnection between different manufacturer's switches is catered for due to the QSIG standard requirement.

3 Reference documentation

TT/ES 1898	Digital Electronic PABX
GT/TD POW 007	Standby Power Supplies for Telecoms
NR/TEL/SP/30025	Standby Power Supply Requirements for Operational Telecommunications Equipment
NR/TEL/SP/30022	Technical Requirements for Communications Engineering Schemes and Services
CW1308	BT Multipair Telephone Cabling Specification
BS6701	Installation of Apparatus Intended for Connection to Certain Telecommunication Systems
ISO / IEC 11801:2002	2nd Edition (category 5e) Category 5e cabling standard
	Health and Safety (Display Screen Equipment) Regulations,1992

4 Definitions

BT

British Telecom

CSA

Cross Sectional Area

CTI

Computer Telephony Integration

DASS2

Digital Access Signalling System Number 2

DDI

Direct Dialling Inward

DP

Distribution Point

DPNSS

Digital Private Network Signalling System

ETD

Extension Trunk Dialling

FTN

Fixed Telecom Network

GC

Global Crossing

IDC

Insulation Displacement Connection

ISDN

Integrated Services Digital Network

MDF

Main Distribution Frame

NPV

Net Present Value

PABX

Private Automatic Branch Exchange

PSTN

Public Switched Telephone Network

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QSIG

Private Network Signalling Standard

RJ45

Registered Jack 45 (voice and data network port definition)

RSDC

Rail Services Distribution Centre

RTIS

Network Rail Information Systems

TJF

Test Jack Frame

TTSL

Thales Telecommunications Systems Limited

UPS

Uninterrupted Power Supply

5 Responsibilities

The design and installation engineers shall ensure that all aspects of this Guidance Note are taken into consideration and acted upon as required.

6 Introduction

This Code of Practice provides a guide to telephone installations for new Network Rail offices. The guide details how work shall be instigated and the subsequent actions that may be taken by the Telecoms Department.

This Code of Practice shall be seen as a live document with regular reviews and amendments in order to remain valid and keep up to date with the changing needs of business and technological developments.

The typical flow of work, which is discussed within this Guidance Note and forms the headings for each section, are as follows:

- i. Work Instigation
- ii. Telecoms Options
- iii. Telephony Design Requirements
- iv. Cabling Design Requirements
- v. Control Rooms
- vi. Design Costs
- vii. Costing Report
- viii. Order Placement
- ix. Installation Project Management

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The basic principles remain the same irrespective of size of installation however, each installation can differ due to the user requirements. Also, larger installations, by their very nature, need more design input from the user and project management involvement. This Code of Practice, therefore, regards telephone system installations over 1008 extensions as larger systems and as such the design of such systems shall be on a per application basis.

As different users have many different requirements from a telephone system this Code of Practice cannot be seen to be exhaustive as each installation, large or small, may have user requirements outside the scope of this Code of Practice, which may need to be taken into consideration.

7 Work Investigation

Work for office telephone installations are instigated by Corporate Offices through the completion of a Facilities Management Projects – Voice Requirement Pro Forma. A copy of this form can be seen in Appendix 1

The Facilities Management Projects – Voice Requirement *Pro Forma* provides details on the site address and access contact. It gives a brief outline of the user requirements, e.g. number of extensions required, voice mail requirement etc., cable infrastructure type, if known. It also gives an estimate of the time scale for the completion of the work.

8 Telecoms Options

From the Facilities Management Projects – Voice Requirement *Pro Forma* the telephone installation options shall be derived. The telephone installation options give rise to their own design and installation requirements as discussed within this Code of Practice. Typical options for Network Rail offices are:

- Network Rail owned and installed PABX
- ETD service from Global Crossing
- ETD in-direct service from Global Crossing
- Other solution requirement, e.g. small office system, key system etc.

9 Telephony Design Requirements

9.1 Network Rail Owned and Installed PABX

9.1.1 Typical Switch Design Requirements

The present telephone system installed on the railway network is the Ericsson MD110. This Code of Practice therefore, provides the design requirements for the installation of an Ericsson MD110 switch. The design requirements for a typical switch have the following considerations:

- i. Number of user analogue or digital extensions required
- ii. Number of spare user analogue or digital extensions equipped and wired
- iii. Telephone system hardware configuration
- iv. Telephone system software configuration
- v. Global Crossing and BT connections
- vi. Recall (earth or time break)
- vii. Voice Mail requirement
- viii. Power and earthing requirement
- ix. UPS / battery back-up requirements
- x. Space and environmental conditions requirements
- xi. Business continuity

9.1.2 Number of User Analogue or Digital Extensions Required

Design considerations for a typical PABX start with the number of extensions required by the user as given on the Facilities Management Projects – Voice Requirement Pro Forma. This would typically be their 'Day 1' requirement and spare capacity should be built into the design. The Facilities Management Projects – Voice Requirement Pro Forma should also state if analogue or digital extensions are required. However further checks should be made with the user representative.

9.1.3 Number of Spare User Extensions Equipped and Wired

The number of spare user extensions for any given switch should be determined from the following table for user requirements of less than 1008 extensions. For user requirements of more than 1008 extensions the spare capacity shall be designed on an individual project basis.

User Extension Requirements	Minimum Spare Capacity Requirements	Total Number of Extensions
16 to 192	16	32 to 208
193 to 400	16	209 to 416
401 to 608	32	433 to 640
609 to 800	48	657 to 848
801 to 1008	64	865 to 1072
> 1008		Designed on an individual project basis

9.1.4 Telephone System Basic Hardware Configuration

When the total number of user extensions to be installed onto the switch is known the remaining basic hardware configuration should be determined.

Additional analogue extensions may be required for fax machines and modems. The table below provides a guide for design purposes,

however, exact numbers should be determined from the users. Each analogue extension card provides 16 extensions.

The DASS2 card should be used for connection to BT ISDN30 using DASS2 signalling. Each card provides up to 30 channels or trunks.

The DPNSS card should be used for connection of DPNSS links to Global Crossing. Each card provides up to 30 channels or trunks.

The voice mail system should be sized in terms of ports to cater for the total number of users. The connection type could also be analogue or digital and may require fax and email in a unified messaging installation. For these reasons the number of ports for larger systems should be determined on an individual project basis.

Number of User Extensions	Additional Analogue Extension Cards	DASS2 Cards	DPNSS Cards	Voice Mail Port Size
16 to 144	1	1	1	4 port
145 to 288	1 to 2	1	1	8 port
289 to 352	2	1	2	8 port
353 to 592	2	2	2	Design on Application
593 to 656	2 to 3	2	3	Design on Application
657 to 896	3 to 4	3	3	Design on Application
897 to 944	4 to 5	3	4	Design on Application
945 to 1008	5 to 6	4	4	Design on Application

For user requirements of more than 1008 extensions the hardware configuration should be designed on an individual project basis.

If the user requirement is for analogue extensions the above table can still be used as the additional analogue card is used for fax, voice mail connectivity and maintenance modems for the switch and voice mail system. If there is a requirement for modems this should be taken into consideration, as additional analogue cards may be required. Additional analogue or digital cards may also be required on larger systems depending on the connection requirement for the voice mail system.

9.1.5 Global Crossing and BT Connections

The philosophy for Global Crossing and BT connections is that all Network Rail offices, unless specified by the user, should be connected to the Global Crossing Network as the main route connection for ETD

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and PSTN calls. Each telephone system should also have a BT connection for fallback purposes.

DDI should be provided by Global Crossing in the first instance. However, should there be any reasons where DDI cannot be provided, e.g. no DDI numbers available from the Global Crossing exchange serving the Network Rail telephone system, then DDI may be provided by BT.

To determine the trunk requirement for a given switch of a predetermined number of extensions the Trunk Chart on page 5 may be used. The Trunk Chart gives a basis for the required number of BT and Global Crossing trunks. Each installation should be discussed with the users to ensure the trunk design quantities match their requirements. The Trunk Chart provides design quantities for basic office premises. Should there be a user requirement for specific voice applications such as call centre technology then the trunk quantities should be sized upon design application.

The trunk quantities can be fine tuned over a period of time when there is historical data available on call trends for a given office location. This can be done by the use of trunk monitoring from supplier data or switch monitoring through a call logger.

Trunk Call

User Extns	16	32	48	64	80	96	112	128	144	160	176	192	208
BT Trunks	8	8	8	8	8	10	10	10	12	12	15	15	20
G.C. Trunks	8	8	10	10	10	12	12	15	15	20	20	20	25

User Extns	224	240	256	272	288	304	320	336	352	368	384	400	416
BT Trunks	20	20	20	25	25	25	30	30	30	35	35	35	35
G.C. Trunks	25	25	30	30	30	35	35	35	35	40	40	40	45

User Extns	432	448	464	480	496	512	528	544	560	576	592	608	624
BT Trunks	40	40	45	45	45	50	50	50	55	55	55	55	60
G.C. Trunks	45	45	50	50	50	55	55	55	60	60	60	65	65

User Extns	640	656	672	688	704	720	736	752	768	784	800	816	832
BT Trunks	60	60	65	65	65	70	70	70	75	75	75	80	80
G.C. Trunks	65	70	70	70	75	75	75	75	80	80	80	85	85

User Extns	848	864	880	896	912	928	944	960	976	992	1008
BT Trunks	80	85	85	85	90	90	90	95	95	95	95
G.C. Trunks	85	90	90	90	95	95	95	100	100	100	100

9.1.6 Recall (Earth or Time Break)

On analogue telephones the recall button provides access to many of the telephone systems features and functions. How the telephone system recognises the recall button operation can be set in two ways as a system parameter. There can be earth recall or time break recall. Setting recall also has an effect on the cabling configuration at the telephone socket however, a basic rule of thumb is:

- For new installations, whether using CW1308 cabling or Category 5e cabling Time Break Recall should be used.
- Where existing installations use Earth Recall, pin 4 on the telephone socket should be connected to earth. Please see section 10.3.2 for the wiring configuration.
- For Category 5e installations where earth recall is to be used the earthing of pin 1 in the category 5e cable should be done at the voice patch panel. Conversely, a two pair presentation of the multicore CW1308 cable can also provide the earth connection from the MDF.

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When extending existing telephone wiring systems the recall type used should be determined to ensure the correct termination of all cabling.

9.1.7 Voice Mail Requirements

Voice mail requirements are determined from the Facilities Management Projects – Voice Requirement Pro Forma. If voice mail is required the system should be sized to cater for all extensions having a voice mail box. Whilst this may not be a Day 1 requirement sizing the system for all extensions allows for flexibility in the voice mail system to add new mail boxes as and when required without additional costs in upgrading at least for the first few years of use.

Voice mail systems are sized in terms of the number of potential users and hence the number of ports connecting to the telephone system. From the table in sub-section 9.1.4 small voice mail system may be sized. Larger voice mail systems should need to be designed on application.

9.1.8 Power and Earthing Requirements

The Ericsson MD110 has specific power and earthing requirements regardless of a UPS requirement. These are:

Power Requirements

1. Two dedicated 13amp double pole switched fused spurs within two meters of the equipment location
2. Three 13amp twin socket outlets for maintenance and peripheral devices within the switch location

Earthing Requirements

1. A 6mm diameter, (28mm CSA), cream earth cable, tagged “Telecom Functional Earth” at both terminating ends, should be installed from the primary earth point of the building as required by BS6701:1994 sub-section 7.10.3.2. The earth cable should be connected to the telephone switch and test jack frame. The earth cable installer should leave 5m of cable at the switch location for connection by the switch installer.

9.1.9 Uninterruptible Power Supplies and Battery Back-up Requirements

The UPS / battery back-up requirements for railway telephone systems are as GT/TD POW 007 Standby Power Supplies for Telecoms. A summary table of UPS / Battery back up usage taken from Appendix C of GT/TD POW 007 is as follows:

Schedule of Equipment, Standby Period and Typical Provision

Equipment	Min. Standby Period (Hours)	Typical Method of Provision
PABX, core node, major site & transit exchange	12	Battery / Rectifier
PABX remote site	12	Battery / Rectifier
PABX non operational office	1	Battery / Rectifier
PABX, key system, secretarial system (non vital)		None
Switchboard (mains powered) emergency calls	12	UPS
Switchboard (mains powered) other calls	8	UPS
Control Applications	12	Battery / Rectifier
Call Logger (emergency call etc.)	12	UPS
Telephone operator directory system (emergency calls)	12	UPS
Telephone operator directory system (other calls)	8	UPS

9.1.10 Space and Environmental Conditions Requirements

Invariably, each installation can have different considerations with regard to the space and environmental conditions for the switch. The telephone switch may share the communications room with IT equipment. However, in some instances the communications room may be for telephone equipment only.

When considering the space plan for the switch there are a number of issues to contend with which are listed below. As each installation may differ the list can not be exhaustive but tries to give an insight into the typical space issues that are encountered. The list is in no particular order of importance.

- i. Room Size – The room should be off sufficient size to house all equipment. If it is a shared room it may also include data equipment. The communications room size and location for the office shall be agreed with the Corporate Office Project Manager

- ii. Room Layout – Working with RTIS the room layout should be determined and agreed. The room layout shall allow for maintenance activity to be carried out on all equipment therefore, access to equipment should be catered for.
- iii. Structural Design – Consideration shall also be given to the structural design of the equipment room floors. Telecoms equipment, in particular external power supplies and battery back-up equipment, can place heavy loading on equipment room floors and the floor structural design should cater for the equipment loading. Advice can be sought from the Regional Building Surveyor.
- iv. Equipment Room Flooding – Consideration shall also be given to the possibility of equipment room flooding. The equipment room design should cater for this possibility however, further advice can be sought from the Regional Drainage Engineer.

When determining the room layout care shall be given to ensure equipment is not installed near water services, below air conditioning plant, in direct sunlight, below ceiling/roof access points, over under-floor access points, near large electrical services installations, where the equipment may foul any entry or exit points to or from the room and should be clear of any fire exit points or fire apparatus.

The MD110 System and Mechanical Structure documentation can be seen in Appendix 2

- v. Cable Access Routes – Cable access routes to the room should be accessible for internal cabling and Telecommunications Service Suppliers cabling.
- vi. Telecommunications Service Supplier Installation - The communications room should also be able to house equipment from Global Crossing and BT. The room should be accessible for any cabling and cater for any power and environmental requirements they may have.
- vii. Lighting – Lighting within the room should be adequate to enable the installation of the switch and for subsequent maintenance. Please note, installers and maintainers may use lap top computers therefore, Category 2 lighting is preferred.

When considering the space and environmental issues of the installation the following Ericsson notes should also be noted:

Heat Dissipation

Each stack when fully equipped may dissipate up to 350 W inclusive of external power supply. The Group switch may dissipate up to 120 W

Equipment Room Requirements

The recommended equipment room requirements are as follows:

1. The air should be free from dust and smoke as well as gases or acid fumes. (The dust and powder content should not exceed 50 micro grammes per cubic metre).
2. There should not be any water, soil or waste pipes located in the equipment room. Neither should there be any manholes or water drains in the floor. If there is a risk of flooding from adjacent areas, impervious walls should be provided with a suitable sill at all door entrances. Water sprinkler systems should be excluded from areas containing MD110 equipment. Where the MD110 equipment is to be sited in a shared area, it should be sited outside the range of the sprinklers.
3. There should be a clear ceiling height of a minimum of 2500mm.
4. The floor should be anti-static. Conductive and computer flooring is preferred, however PVC tiles or sheeting, composition blocks or wood block can be used. If PVC sheeting or skirting is used, all seams should be welded. No silicon based floor polishes should be used within the confines of the equipment room. The floor loading maximum should be 150kg/m².
5. All floor surfaces should have a surface to electrostatic discharge protected area, EPA, ground resistance on between $7.5 \times 10^5 \Omega$ and $3.5 \times 10^7 \Omega$ in accordance with BS EN 61340-5-1.
6. The relationship between temperature and air humidity should not cause condensation. The relative humidity should be 40-65%.
7. Illumination at the lowest working level should be fluorescent and equipment should be protected from strong sunlight. Lighting requirements are for 500 LUX with 100 LUX recommended for operators.
8. Wall and ceiling finishes should be hard. They should be non-dusting and of a light colour.

9.1.11 Switch Maintenance

As from June 2003 Network Rail will have in place a 1-year maintenance contract for all office telephone systems. All newly installed telephone systems should be incorporated onto the contract through a variation to contract agreement.

The contract is administered by HQ Supply Chain. They should be contacted in the first instance to determine the variation to contract requirement.

9.1.12 Business Continuity

The design of the PABX inherently provides business continuity arrangements to the extent that there are BT lines for fall back purposes and up to 12 hour battery back up. When discussing business continuity there are other issues which may need to be addressed. E.g.

Problem / Risk	Mitigation	Action
Complete telephone system breakdown	1) High Risk sites should have ETD or BT lines installed in sensitive areas. 2) Bypass telephones should be installed if deemed necessary at the design stage. 3) For low risk offices mobile phones may be used to make and receive calls.	1) Use ETD or BT lines, report fault to switch maintainer 2) Use bypass telephones, report fault to switch maintainer 3) Use mobile telephones, report fault to switch maintainer
Alarm Monitoring	1) All sites should have the switch alarms monitored by the maintainer.	1) Maintainer monitors alarms and rectify alarm faults. 2) Faults reported by users to be reported to the maintainer

Business Continuity Definitions

High Risk – Operational sites, Control room sites

Low Risk – Business office sites

9.2 ETD Service From Global Crossing

9.2.1 ETD Service Design Considerations

The ETD service provided by Global Crossing is classed as a managed service. When designing an office installation using the ETD service the following aspects of the installation should be considered.

- Global Crossing Network Infrastructure
- Global Crossing Switch Type and Capacity
- Surveys
- Digital / Analogue ETD
- Handsets
- Voice Mail

9.2.2 Global Crossing Network Infrastructure

When investigating the use of ETD lines in an office it should be determined whether Global Crossing have network infrastructure installed into the building in question. If there is a supply cable, generally copper, then the cable size may need to be determined and also the working state of the cable may need to be known, e.g. how many spare pairs are available and how many of those pairs are faulty and not available for use.

In order to determine this information a survey may be required. A survey can be ordered from Global Crossing Rail Services Distribution Centre, (RSDC). It should be stated what level of survey is required as this has a bearing on the cost. Global Crossing use Thales Telecommunications Services Limited, TTSL, to run and maintain the railway telephone network. Generally, TTSL carry out the surveys. The Network Rail point of contact remains Global Crossing for all survey work of this nature.

Further information on Surveys and the Global Crossing RSDC can be seen in sub-sections 9.2.4 and 14.2.1 respectively.

9.2.3 Global Crossing Switch Type and Capacity

The Global Crossing switch type and capacity should be determined when ETD lines are to be installed. Knowing the switch type allows for any training requirement to be identified for the new office occupiers especially if they are to use digital handsets. The capacity of the switch should be known to determine if there are enough spare ETD lines on the switch to cater for the new office requirement.

In order to determine this information a survey should be ordered. A survey can be ordered from Global Crossing Rail Services Distribution

Centre, (RSDC). However, it should be stated what level of survey is required as this has a bearing on the cost. Global Crossing use Thales Telecommunications Services Limited, TTSL, to run and maintain the railway telephone network and generally, TTSL carry out the surveys. The Network Rail point of contact remains Global Crossing for all survey work of this nature.

Further information on Surveys and the Global Crossing RSDC can be seen in sub-sections 9.2.4 and 14.2.1. respectively.

9.2.4 Surveys

To determine the Global Crossing network infrastructure, switch type and capacity and internal cabling capacity a survey may need to be ordered. Global Crossing use Thales Telecommunications Services Ltd. to run and maintain their network and it should be Thales who carries out the survey. A basic survey can provide details of cable sizes and spare extensions on the switch. If more detailed information is required e.g. a cable check for spare and faulty pairs, then this should be stated. When ordering the survey the office requirements should also be stated, e.g. 50 digital ETD lines and 5 analogue ETD lines to a Network Rail patch panel. This gives the boundary for the survey and allows a quotation to be produced. The quotation should also provide the costs of any infrastructure and accessory requirements.

The survey results and a quotation for any work required should be generated by Thales and sent to Network Rail via Global Crossing. If any further action is required, such as a more detailed survey, an order should be requested via Corporate Offices to the Global Crossing RSDC.

A sample email survey request, Global Crossing survey order and TTSL survey result document can be found in Appendix 2.

9.2.5 Digital / Analogue ETD

Whilst digital extensions are available from Global Crossing they are not available in all areas consequently analogue extensions may be the only option. This should be determined during the survey. If digital ETD lines have been requested and only analogue ETD lines are available the Corporate Office Project Manager should be informed to enable the information to be passed on to his/her client.

Digital ETD lines use proprietary handsets therefore their rental would normally form part of the order to Global Crossing.

Please note, digital ETD's also have a distance constraint of 1Km from the switch for all installations, (see technical specifications in the MD110 System and Mechanical Structure documentation in Appendix 3)

All fax machines and modems should have analogue ETD lines installed.

9.2.6 Handsets

As digital handsets are proprietary the main issues with handsets revolve around the buy or rent view for analogue handsets. Rental of the handsets incurs on-going rental charges however the handsets should be covered for maintenance and replaced when faulty. The buy option may well be cheaper in the long run but may need maintenance support over the lifetime of the ETD line use. The decision to buy or rent would normally be made on a case-by-case basis by the users.

9.2.7 Voice Mail

Voice mail services are provided through the Global Crossing Power Mail product. Voice mail should be ordered on a separate order through the Network Rail Account Manager **not** the RSDC in the first instance. Please see section 10, Design Costs for the Global Crossing Account Managers details.

9.3 ETD In-Direct Service From Global Crossing

9.3.1 ETD In-Direct Design Considerations

The ETD in-direct service uses BT analogue exchange lines, over which, ETD telephone numbers and hence railnet access is obtained. The routing for this service is through the BT network via Cable & Wireless to Global Crossing. To make calls over the railway telephone network from the BT exchange line a code is prefixed to the ETD number being dialled. Global Crossing can advise what this code is on a site-by-site basis. Incoming calls from the ETD network are dialled in the normal way, e.g. geographical code and ETD number. To receive calls internally the caller may dial the ETD number. To receive calls externally the caller may dial the BT exchange line number.

Please note, when ETD in-direct is used there are installation, rental and call charges for the BT line and installation and rental charges for the ETD line.

When designing an office installation using the ETD in-direct service the following aspects of the installation should to be considered.

- BT Network Infrastructure
- BT Analogue Exchange Lines
- Global Crossing ETD In-Direct numbers
- Handsets
- Voice Mail

9.3.2 BT Network Infrastructure

In order to provide BT analogue exchange lines, BT network services over copper should be present in the building. Their network presence may be apparent during a site visit however BT would usually only carry out a survey upon the placement of an order. Should additional BT cabling be required they would generally install it at their cost in most cases. If the site is remote from their network, BT may wish to charge for the installation of the cable. Care must be taken as this could cost thousands of pounds particularly in rural areas.

The price of the exchange line installation includes the installation of the telephone socket. If CW1308 cabling is to be used a layout diagram may be required for the BT installation technicians. If Category 5e cabling is to be used in the office then additional multicore cabling may be required between the BT Distribution Point, (DP), and the patch panel.

9.3.3 BT Analogue Exchange Lines

BT exchange lines are basic analogue telephone lines that can be connected to analogue equipment such as analogue handsets, fax machines and modems. When presented over category 5e wiring they require a master RJ45 to telephone line plug converter to be installed.

Each exchange line has its own BT telephone number that can be used for receiving calls over the PSTN.

Line faults should be reported to BT Faults on 154

9.3.4 Global Crossing ETD In-Direct Numbers

With the BT exchange lines installed, Global Crossing should assign an ETD number to each exchange line number. Global Crossing should advise the numbers allocated.

To make calls over the railway telephone network from the BT exchange line a code is prefixed to the ETD number being dialled. Incoming calls from the ETD network are dialled in the normal way, e.g. geographical code and ETD number.

9.3.5 Handsets

The usual option for in-direct ETD lines is to purchase analogue handsets however the local office should have a means of replacing broken or faulty handsets. This would usually be through purchase requisitions to the zone Supply Chain office.