SIGNAL & TELECOM DIRECTORATE

(TELECOM SECTION)

Research, Design and Standards Organization, Lucknow-226011

FUNCTIONAL REQUIREMENT SPECIFICATION (FRS)

FOR

Emergency Communication System

(using Optical Fiber Cable)

(Authority- 42nd Telecom Standards Committee (TCSC) meeting held on 20.12.2024 & 21.12.2024.

1.1. FOREWORD:

1.1.1. The purpose of this document is to define the functional requirements for the implementation of an emergency communication system over the Indian Railways network using optical fiber cable (OFC) as the primary communication medium. This system aims to extend communication at every kilometer along the track.

1.2. Scope

1.2.1. The system will provide real-time and secure communication capabilities using optical fiber as ~~the primary~~ media between railway control room and sockets provided along with the track. The system will be used by loco pilots/train managers in case of accident and other emergencies or by maintenance staff during maintenance work in between the sections.

1.2.2. This FRS will specify two types of communication system:

1.2.2.1. Existing six pin emergency communication system will work on fiber backbone instead of Quad cable using power supply at each socket. (Part A)

1.2.2.2. The fiber will be terminated at each location of communication point the handy phone having power source will be connected to the termination of fiber directly. (Part B)

1.3. Functional Requirements of the System

Part (A)

1.3.1. Typical architecture / block diagram of the system is given as figure-1.

1.3.2. The system will consist of Headquarter Equipment and Emergency communication post equipment.

1.3.3. Headquarter Equipment will consist:

1.3.3.1. Fiber termination point- Two nos. (SC-APC)

1.3.3.2. Audio amplifier suitable to give audio.

1.3.3.3. Speaker.

1.3.3.4. Mike.

1.3.4. Emergency communication post equipment will consist:

1.3.4.1. Six pin socket as per IRS: TC 42:20 fitted in suitable box.

1.3.4.2. Fiber termination point- Two nos. (SC-APC)

1.3.5. Existing 4/2 wire portable control telephone as per IRS:TC: 75-99 / Light weight portable control Telephone as per IRS TC 78-2000 presently being used for Emergency communication will be used in the system. When any of these telephone is inserted in six pin socket user will be able to converse with Headquarter equipment.

1.3.6. Suitable size metal/FRP box to accommodate six pin EC socket, EC post equipment and SMPS power supply should be provided by system provider.

1.3.7. The box should be designed such that rain water should not effect the circuitry

provided in the box.

1.3.8. The electrical signal coming from six pin socket will be converted to optical signal through suitable media converter. The media converter shall be part of emergency communication post equipment.

1.3.9. This optical signal will go to next socket in EC post equipment.

1.3.10. The second port of media converter will be connected to next socket. The single fiber will be connected in between EC posts.

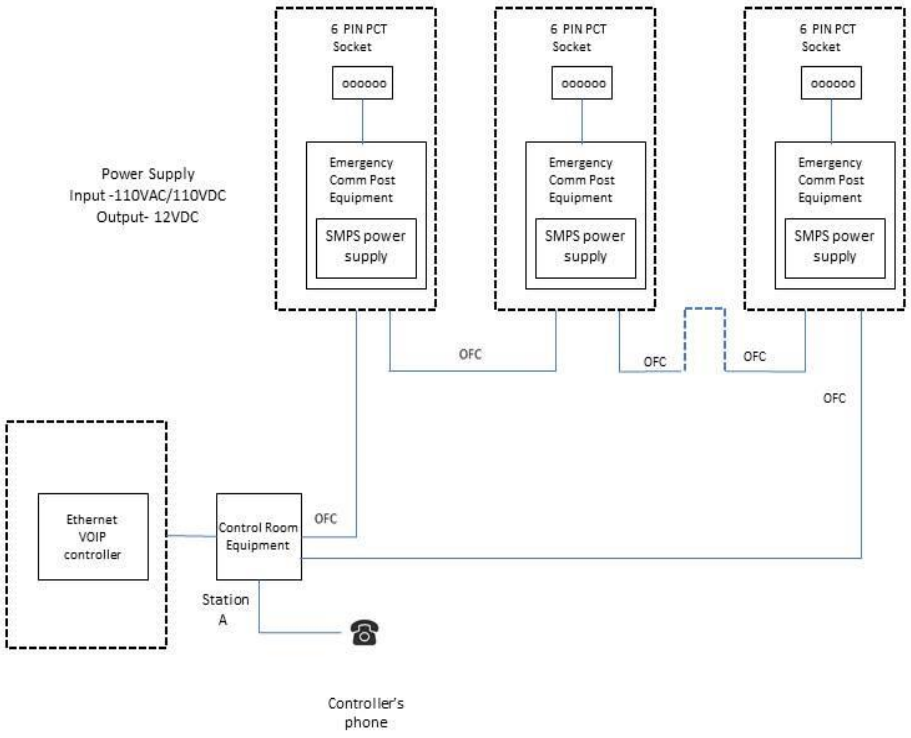
1.3.11. At the end second port of media converter will be connected to first media converter through another fiber.

1.3.12. These EC post equipment should work on 12 V DC .Suitable SMPS based power supply should be used to drive 12VDC from nearest available 110 V AC or 110 VDC.

1.3.13. The system should be capable to handle at least 100 sockets simultaneously.

FIGURE-1

LINE DIAGRAM FOR EMERGENCY SOCKET COMMUNICATION SYSTEM



1.4. Power Supply

1.5. Headquarter equipment shall be able to work properly with 230V AC/12V DC commercial

power supply as input. The other supplies required for system shall be derived from this 230 V AC. Railways will provide 230V AC commercially available local supply at control office.

1.6. The EC post equipment shall work on 12 VDC. The SMPS power supply should be used to drive 12VDC from 110VAC/110VDC available at signal post/LC gate/any other feed point available nearer to socket.

1.7. The required Earthing/Surge protection arrangement shall be provided by the System provider.

PART-B

1.7.1. Typical architecture / block diagram of the system is given as figure-2.

1.7.2. The system will consist of Headquarter Equipment and Emergency communication telephone set.

1.7.3. Headquarter Equipment will consist:

1.7.3.1. Fiber termination point- Two nos. (SC-APC)

1.7.3.2. Audio amplifier suitable to give audio.

1.7.3.3. Speaker.

1.7.3.4. Mike.

1.7.4. Emergency communication telephone set will consist:

1.7.4.1. Fiber termination point- Two nos. (SC-APC) looping shall be done using patch cord.

1.7.4.2. Power supply unit.

1.7.4.3. Telephone set

1.7.4.4. OFC patch cord -02 nos. (2 meter each)

1.7.5. Emergency communication Post:

1.7.5.1. Suitable Metallic/FRP box(enclosure).

1.7.5.2. Terminations of optical fibers (two socket for SC-APC)

1.7.5.3. Patch Cord(less than 0.5mtr)

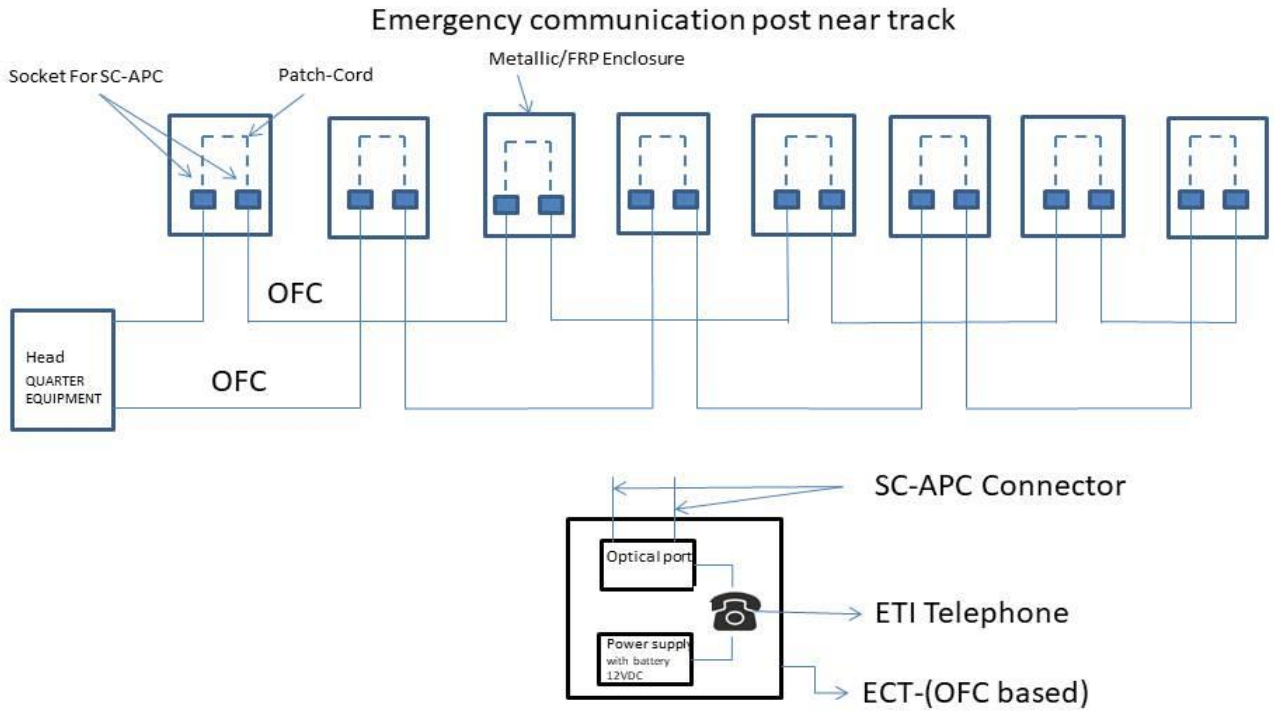


Fig-2

1.7.6. Working

1.7.7. At emergency communication post, (located at along the track) fiber will be terminated at SC-APC connector and will remain in loop condition using patch cord.

1.7.8. Whenever one has to connect emergency communication telephone he will remove the loop of fiber at emergency communication post and connect the output of ECT (OFC based) to the fiber termination.

1.7.9. On inserting the fiber, system will get energized through power supply unit provided with ECT (OFC based).

1.7.10. On picking the handset of telephone speech circuit will get connected to headquarter equipment and will be able to converse with the mike and speaker arrangement provided at headquarter.

1.7.11. ELECTRONIC TELEPHONE INSTRUMENT (ETI):

1.7.11.1. The ETI will have a minimum of 3x4 standard telephone keypad and will function on tone dialing system.

1.7.11.2. The Electronic Telephone Instrument having a valid certificate issued by TEC conforming to the Mandatory Essential Requirements of TEC for 2-Wire Telephone Equipment (for Electronic Telephone Instrument) (as revised by TEC

time to time) shall be procured from any firm may be used.

1.7.11.3. The system shall be fully compatible with above telephone instruments and work efficiently with above telephone instruments.

1.8. Power Supply

1.8.1. Headquarter equipment shall be able to work properly with 230V AC/12V DC commercial power supply as input. The other supplies if required for system shall be derived from this 230 V AC. Railways will provide 230V AC commercially available local supply at control office**.**

1.8.2. ECT shall work on reliable source of 12 VDC. The battery provided in system should be rechargeable suitable charger should be provided along with the ECT.

1.8.3. The required Earthing/Surge protection arrangement shall be provided by the System provider.

1.9. Environmental/Climatic Conditions

System shall be capable of working satisfactorily under Prevailing Climatic Conditions over Indian Railways i.e. Dry heat test, Cold heat, Change of temperature, Vibration test, Mechanical shock test, Bump test, Salt mist test, Dust test, Ingress protection etc.. Limitation/pre-requisite if any may be indicated by the system provider.