Intrinsically Safe Digital Enhanced Cordless Telephone(DECT) Based Communication System for Underground Coal Mines and Likewise Other Hazardous Areas.

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ABSTRACT

Advancement in Electronic Communication & Information technology (EC &IT) have establish connectivity (Communications) to remotest places and even inaccessible places. Communications through tunnels, Metro-railway by adopting hybrid techniques(Both wired and Wireless) and also mobile(Wireless) in collaboration with a number of repeaters (amplifiers- Both transmission and Receiver) have been successful and widely used . However , the situation is different in case of underground mine and likewise hazardous area so the technique employed so far for communication through Tunnel, Metro-railway needs change in design criteria for establishing reliable and fool-proof communication system for underground mine communication.

The authors in this paper restricts their study about communications in and around underground coal mines.

There are many constraints that put hindrances in communication through or in and around underground mines(U.G.) ,especially in coal mine. Firstly, the typical geological structure ,labyrinth galleries and thick roof-strata having many levels (Seams) with hard structure roofs and side galleries walls cause the marked attenuation of radio and other high frequencies waves.

Secondly, prevalent of inflammable gas such as methane limits the transmitting and receiving power of transceiver or mobile phones inside mine and also restricts the transmitting & receiving power of the repeater.

Although there are few wireless communication systems – an assembly of both wire and wired systems for communications in mines but these could not termed as fool-proof systems for underground communication. The mine workings are very tough and of hazardous environments and fall of roofs, walls etc are regular phenomena. In case of such eventuality, it is likely that wires could be snapped –off.

The authors in this paper describe Intrinsically safe Digital Enhanced Cordless System(DECT) which was installed in two coal mines in India and establishes communications among various subscribers in U.G area and also establishes communications from underground to surface and vice-versa..

Fistly , the authors explain the system architecture, protocol structure of various layers (Operational Standard International –OSI) ,Media Access System(MAC) and special features of DECT system In this system, the networks utilizes three layers because the services of higher layers or an intermediate layer does not require.However, any data network could fit into the OSI model.

The Medium access control(MAC) layer establishes, maintains and releases channels for higher layers by activating and deactivating physical channels .

Finally the authors in this paper explains in details design criteria for making the Digital Enhanced Cordless Telephone(DECT) ,intrinsically safe to be used in underground coal mine or any like wise hazardous areas where prevalence of explosive gases exist.

The literature survey conducts by authors and recent progress status of mobile communication in the underground coal mines or likewise other hazardous areas in the world confirms that the System(DECT) installed in coal mines in India is first of its kind in world