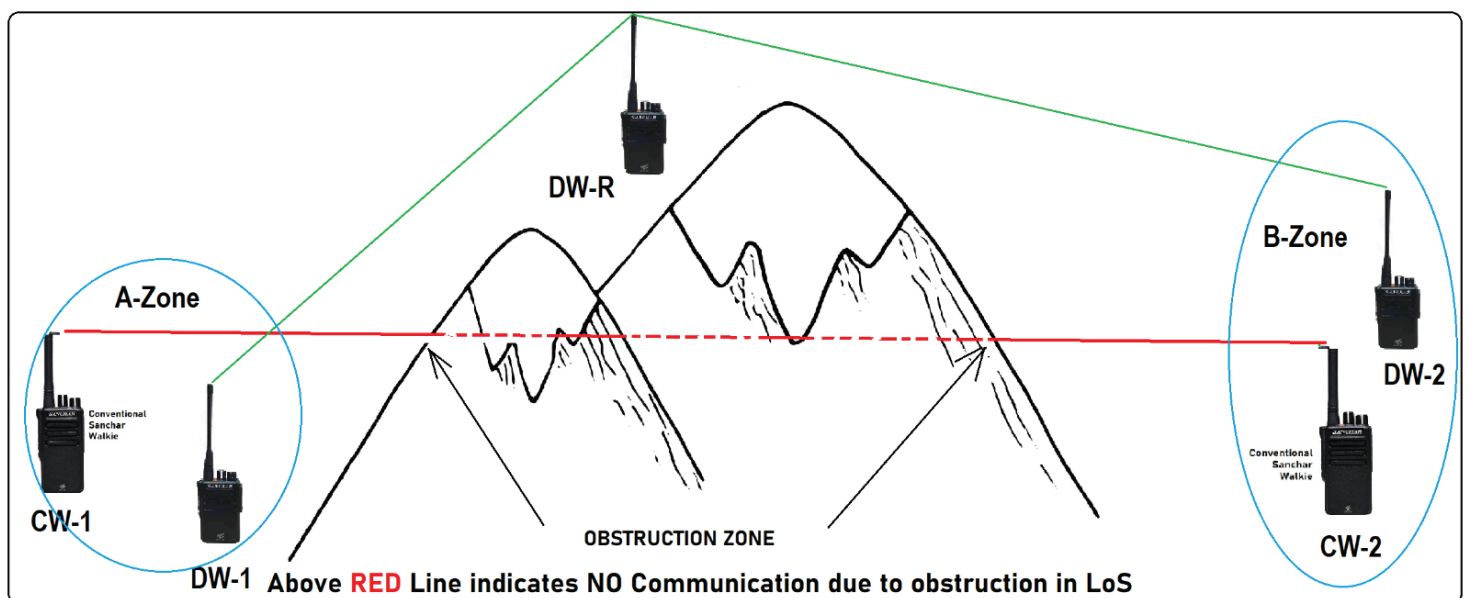




SANCHAR
WIRELESS COMMUNICATIONS LTD.

A CASE STUDY ON INTRODUCTION OF SANCHAR'S NEW PRODUCT CALLED "DIGITAL RELAY RADIO (DRR)" AT CENTRAL COALFIELD, RANCHI

An introduction of DIGITAL RELAY RADIO (DRR) : This is a complete and unique system of wireless communication, in a non-conventional way better than existing VHF/UHF radio communication system. This is one step advance than conventional radio, because in point-to-point communication scenario, through conventional radio, clearance on LoS (Line of Sight) is essential, whereas DRR communication system is capable to establish ultimate radio link, even having No LoS, between targeted point of communication. This special & Unique Phenomena is being explained in the figure below.



For an example, CW-1 and CW-2 are the conventional walkie, trying to communicate from, A-Zone to B-Zone. But due to obstruction in Line of Sight (Red Line), they can't communicate. Whereas DRR walkies DW-1 at A-Zone can easily communicate with DW-2 at B-Zone, through a third walkie, DW-R, which will relay the signal received from DW-1 and re-transmit the same to DW-2 with clear LoS (Green Line).

Main System components of DRR Solution: Basically, there are two types of system components in the entire system, one is Handheld Walkie-talkie, Model: G5Ui and second is tower mountable DRR Extender, Model: G10Ui. This extender's RF power output is 10 watts, which is more than G5Ui Handheld of 5 watt. So due to high throughput, this G10Ui is used like a base station of Conventional radio system and thus suggested to installed directly at tower or high-altitude place, to enhance its range of communication.

Application and demonstration of DRR system at CCL, Ranchi : This Demonstration was performed on & from 28/01/2021 to 30/01/2021, for Karma Project and Topa Project at Kuju area against a specific requirement from CCL management.

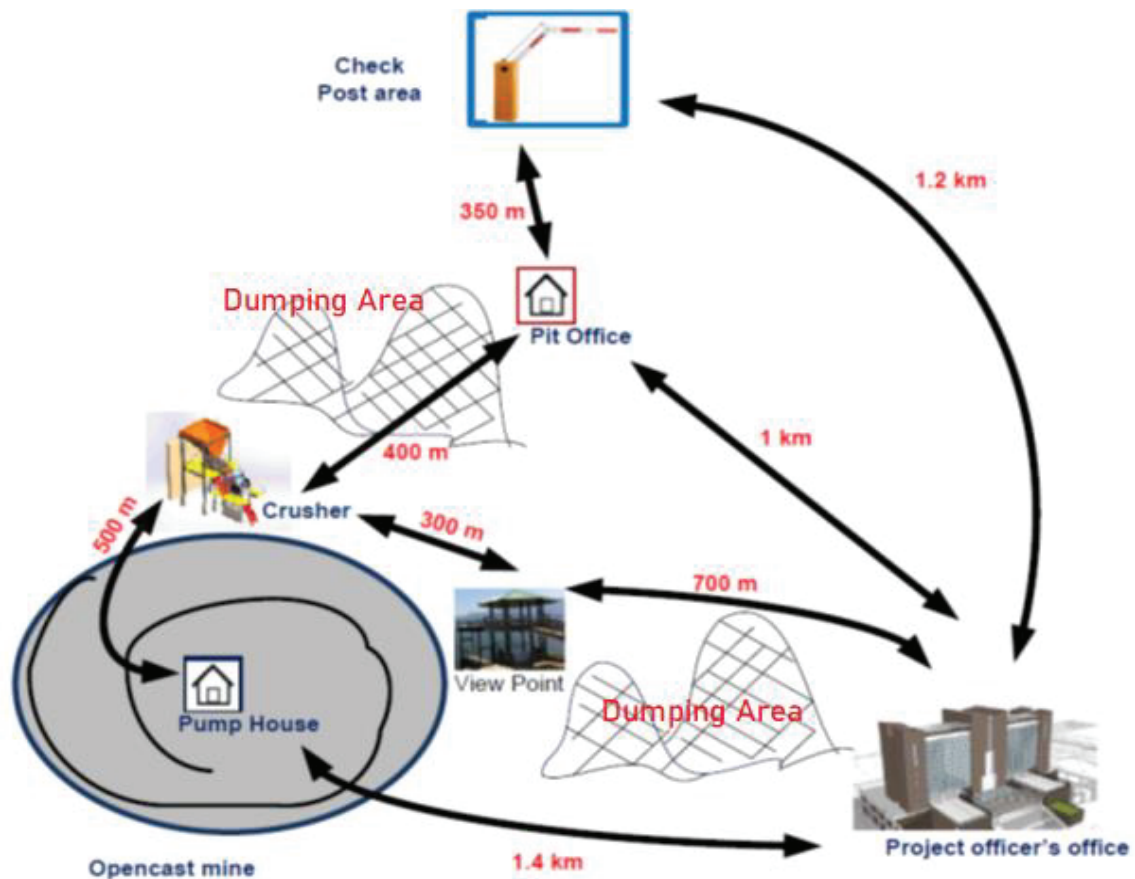
Requirement: The basic requirement at those open cast coal mines is the communication between the Project officer, Pit office, Pump house at the bottom level of mine because the project officer need to know every minute's activities at the mine. Sometime the workers at bottom level of mine need technical helps or want to inform regarding any issues to reporting persons at the surface for which previously they come to the surface area for every single need which is not good as per production or safety point.

The senior officials want to inform anything to all the workers from their office at urgent basis is their main objective. So, they want these two purposes to be fulfilled. But as per discussion they previously think for two different systems for above purposes e.g., remote communication, remote addressing.

Demonstration performed for two projects, 1. Karma Project, 2 Topa Projects:

About Karma Project: This is an opencast mine at Kuju area and the Project Officer (PO) want to communicate with Pit office, View point, throughout mines inclined sections, pump house area at bottom level of mine and check post area. The main issue is the high dumping area between the mines' site and PO office. The testing has been done from every node points as mentioned above. The testing was successful without DRR extender, but keeping DRR Handheld model G5Ui at all location mentioned in the table below. However, for better performance we have suggested to use the DRR with high gain antenna at all nodal point of location.

Sl. no.	From the point of Location	To the Point of Location	Distance in Km	Remarks
1	Projects office	Check Post	1.2	Testing successful
2	Projects office	Pit Office	1.0	Testing successful
3	Projects office	Crusher via View point	1.0	Testing successful
4	Projects office	Pump House	1.4	Testing successful
5	Pump House	Crusher point	0.5	Testing successful
6	Crusher Point	Pit Office	0.4	Testing successful
7	Pit Office	Check post	0.35	Testing successful



About Topa Project: They need communication between PO office, Pit office, railway siding, weigh bridge, throughout the mines inclined sections and pump house area at bottom level of mine. The main issue is the high dumping areas and the line of sight is not that helpful. The testing has been done from every node points as mentioned above. The testing was successful with DRR extender with high gain antenna in between handheld mesh radios. Without DRR box the mesh radios can communicate to each other up to pit office from Weigh Bridge but with slight noise and voice break. For better performance we have used the DRR extender with high gain antenna. At most of the node points they can provide 220 V AC power to the DRR. And the places where the 220 V AC power is not available, we have suggested to use the solar panel. The biggest problem is the communication from PO office as that is situated in crowded area. So, one DRR should be installed in between Pit office and PO office. The summary of distances between every node point's up to which the successful communication has done are as below:

Sl. no.	From the point of Location	To the Point of Location	Distance in Km	Remarks
1	Railway Siding	Weigh Bridge	1.0	This site requires min. 4 nos. DRR Extender as per testing & survey (may vary as site requirement). 1. Railway siding, 2. Siding area; 3. Towards PO office from Pit office, 4. Towards mines incline.
2	Siding Area	Pit Office	1.0	
3	Railway Siding	Pit office	2.0	
4	Pit Office	Testing point towards excavation area	0.5	
5	Pit Office	Towards P.O office	0.3	
6	Railway Siding	Towards P.O office	1.3	

