

**OPTIMAL UTILIZATION OF RADIO  
COMMUNICATION NETWORK IN CEYLON  
ELECTRICITY BOARD: A CASE STUDY**

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Science

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## **Abstract**

A very high frequency (VHF) and ultra high frequency (UHF) network is used in Ceylon Electricity Board (CEB) for communication purposes within the company. This network is specially used in the field activities such as in breakdowns & projects. This network is fully owned by the CEB and it is maintained by the company itself.

This network is used four bands of frequency called VHF low band (LB), VHF mid band (MB), VHF high band (HB) and UHF band. Also there are four different types of radio equipment in the network called repeaters, fixed sets, mobile sets and hand held sets. Repeater station is used as an amplifier station for long distance communication. Radio sets which are installed in the office places like project offices and customer service centers are called fix sets. Radio sets are installed in vehicles which works in the field are called mobile sets. There were 34 numbers of repeaters, 1000 fixed and mobile sets, 814 hand held sets and 13 other radio equipment at the end of 2010.

Presently, this network is not used by most of the uses because of its drawbacks and alternatives. Lots of breakdowns are being reported. It can be a because of an equipment fault, a DC supply fault, a battery fault or an antenna fault. There are several reasons for these breakdowns such as carelessness of uses, oldness of equipment, less knowledge of the network, coverage issues, lightning and corrosion issues. Mobile telephones are widely used as a communication medium in field activities without using existing VHF/UHF network. For the year 2010, around 18.5 million Sri Lankan rupees (LKR) have been expended by the CEB as the operational and maintenance (O&M) cost of VHF and UHF network. When considering the economic benefits of using a mobile operator as an alternative solution to maintain this VHF and UHF network, it is profitable. But non economical benefits of VHF and UHF networks such as broadcast facility, security and fast response are very critical in the power system. So maintaining this network for optimum use is essential.

As a first step, all existing drawbacks have to be avoided. There should be a proper maintenance plan and all users have to be educated about the system and its usefulness. Also the network planning system has to be optimized. A network

expansion model was derived for future expansions of the network. When this network expansion is used, most of parameters which have to be considered when planning the network can be optimized. They are frequency band, antenna type, transmission power, antenna location and antenna height. Parameters which calculated from this model can be verified using software tools. In addition to that in all installation works, good practices have to be followed to reduce losses and improve the availability of the network.

When there is a properly maintain and widely covered network, the communication media within the company will so powerful than before. Then power system reliability will be improved. Finally this will improve the quality of the Sri Lankan power system. However, it is to be studied about the VHF and UHF communication systems before starting this challenging business.



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*To my teachers, wife, parents and friends*



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## LIST OF ABBREVIATIONS

Abbreviation	Description
AC	Alternative Current
AO	Area Office
AMU	Area Maintenance Unit
CCC	Communication Control Center
CE	Chief Engineer
CEB	Ceylon Electricity Board
CSC	Customer Service Center
DB	Digital Bearer
DC	Direct Current
DGM	Deputy General Manager
EE	Electrical Engineer
ERP	Effective Radiated Power
FM	Frequency Modulation
FOB	Free On Board
HB	High Band
HF	High Frequency
KRS	Keyhole Radio Simulator
LOS	Line of Sight
LB	Low Band
LKR	Sri Lankan Rupees
MB	Mid Band
MLKR	Million Sri Lankan Rupees
MW	Micro Wave
NA	Not Available
O&M	Operation and Maintenance
PDM	Provincial Distribution and Maintenance Unit
PS	Power Station



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R1/2/3/4	Region 1/2/3/4
UHF	Ultra High Frequency
SIM	Subscriber Identity Module
SLT	Sri Lanka Telecom
TRC	Telecommunication Regulatory Commission
VHF	Very High Frequency
WIM	Walfisch-Ikegami Models



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