

**INVESTIGATION ON LIGHTNING IMPACT TO
NEIGHBORHOOD GROUPS DUE TO THE
TELECOMMUNICATION TOWERS**

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree
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DECLARATION

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ABSTARCT

The investigation has been conducted to study the hazardous environment created in the neighborhoods in the event of a lightning strike to the Telecommunication tower. This thesis provides comprehensive analysis on the lightning scenarios in 18 communication and broadcasting towers situated in similar and different isokeraunic contours in Sri Lanka.

The results and observation show that most of the damages reported due to the indirect lightning flashes, power line surges and step voltage in the event of lightning strike to the tower. The property damages such as patches and cracks developed in their walls and floors, the damages to electrical and electronic equipment such as electrical switch gears, bulbs, socket outlets, televisions, and radios also reported. The personal injuries were in the form of temporary paralysis due to step potential or electric shock. In one case, the victims were sleeping on floor in his home which is located around 40m away from the tower and also the altitude is low with compared to the tower ground level. In another case the victims were sitting on the chair with legs on the ground in his home which is located around 30m away from the tower and also the altitude is low with compared to the tower ground level. The descriptions indicate that they have been subjected to step potential.



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The above scenarios with related to the lightning strikes to telecommunication tower going to explain with the geographical arrangement of tower surround, Earth resistance values measured, tower grounding arrangement, power line lightning protection system and the commercial power distribution to the area by Earth resistance tester, technical theories and simulation software.

The outcome also shows that equipotential bonding of the grounding system, a distributed grounding network including a ring conductor and a suitable system of surge protective devices to radio base stations and neighborhood homes play a much vital role in lightning protection of equipment and safety of neighborhood people compared to the effects of simply achieving a low grounding resistance. However, in the absence of such integrated, distributed and equipotentialized grounding system, a high value of ground resistance will sharply increase the possibility of accidents and damage.

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ABBREVIATIONS

RBS	Radio Base Station
BTS	Base Transmission Station
DF	Direction Finder
GSM	Global System for Mobile
ESE	Early Streamer Emission
LPS	Lightning Protection System
IEC	International Electrotechnical Commission
SRF	Surge Reduction Filter
TSG	Transient Spark Gap
CVM	Collection Volume Method
MW	Micro Wave
ODU	Out Door Unit
IDU	Indoor Unit
TRC	Telecommunication Regulatory Commission



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