CHAPTER 6

6.0 CONCCLUTION AND RECOMENDATIONS

All inspected towers are maintained as per the "Guidelines on Antenna Structures" provided by Telecommunications Regulatory Commission of Sri Lanka Colombo. The materials, dimensions and installation arrangement of the Air termination, down conductor and grounding system are as per the IEC 62305-3 (2006).

With the observed data we do not have strong evidence to make any conclusive remarks regarding the necessity of a separate down conductor for the protection against lightning strikes. The tower structure itself seems sufficient of providing safe passage to lightning current.

Also there may be possibility of happening CVM by passes as reported in theories and practical cases. Therefore it is recommended not to using magnetic devices such as mobile phone during lightning, near the telecommunication towers. There are some evidences as mentioned in observations of lightning damages regarding mobile phone usage during lightning.

In the stage of tower erection, we do the basic crow foot grounding system. That is a standard design irrespective of tower location, keraunic level, soil condition etc. And further improvement done after any complain or damages reported. Therefore it is recommended to design the best suited grounding system, for a given tower site. Our analysis show that at tower sites on extremely high resistive grounds; rocks and sandy soil, the transient equipotentialization is more suitable for the safety of people and protection of equipment instead of attempting to achieve low ground resistance. Therefore ring conductor also recommended in such sites earth electrode (type B arrangement) should preferably be buried at a depth of at least 0.5 m for bare solid rock [17]. For the rocky areas we can use earth mesh with chemical compound that reduce the earth resistivity to arrange distributed earth as shown in Figure 6.1

Figure 6.1: Distributed earth with copper earth mesh

(Source: Author)

Throughout the research we were discussed about space restriction for the earth resistance improvement. So that we recommended to use chemical ground rods and it provide low impedance earth to effective dissipate and electrical fault currents. This is ideal in situations where space is restricted and normal lightning earths such as radial and grid type systems cannot be installed.

Figure 6.2: Chemical rod installation in space restricted places

(Source: Author)

It is recommended to install base band surge arresters (air gap arrester) in all MW links installed and replace it at least once in three year. For the towers located in high keraunic level regions, it is recommended to replace it once a year. These recommendations are based on the facts collected during the research.

We also emphasize some careless practices repeated by neighbors. As per the observed data all most all the neighborhood equipment damages were due to careless practices of using electrical equipment. The people forget to remove power cables from the power socket outlet when they are not using the electrical equipment such as televisions, radios etc. Therefore it is recommended to remove power cables from power socket especially during lightning and night. Therefore it is better to arrange awareness programs to the neighborhoods regarding the effects of lightning and safety precautions to minimize the effects.

In some areas we cannot protect lightning protection systems installed in RBS from theft. This kind of behaviors are also cause to lot of lightning damages to RBS equipment as well as equipment damages in neighborhoods.

It was clear that there may be a voltage rises in power line due to direct strike to the tower with the RBS power line surge protection system. To minimize the damages we recommended installing secondary surge arrester with proper rating at the power entrances (at meter cubical) of the RBS. The effective configuration proposed is phase to ground and neutral to ground arrangement as simulated in Figure 4.24.

Simulation results shows that reduction of earth resistance has no much influence on reduction of voltage rises in power lines. But reduction of earth resistance very much important for make proper path for the lightning discharge.

The way of earth resistance measurement also should be addressed. The readings taken for the earth resistance value in RBS are questionable. We cannot recommend the way of measuring earth resistance in towers. There are some practical reasons and restrictions to have accurate reading. Therefore it is time to thinking of an effective way of measuring accurate earth resistance in telecommunication towers.

In results and analysis, we have observed a relationship between the geography of site location and the lightning damages. It is just an observation and need a further analysis to scientifically prove it.