



Telco Protection

Summary

Telephone room grounding and protection.

Notes

Moist earth is conductive and has a velocity of propagation that varies with its conductivity. However, copper (as in telephone cables) is much more conductive than earth. Since there is an elevated potential in the strike area, the potential difference across the cable insulation to the (yet to be elevated) copper conductors exceeds the rated breakdown voltage of the outer sheath. An arc is established through the sheath rupture and the inner conductors are also elevated in potential. This elevated potential is rapidly propagated through copper conductors towards the telephone equipment room. The telco installed protectors turn on as the elevated potential arrives at the protection panel, but as soon as the capacitance of the ground wiring is charged, the high inductance of the total ac power safety ground path chokes off current flow. As the current flow is choked off, the voltage rises on the protector panel and all connected equipment. Damage occurs when the rapidly rising voltage exceeds the breakdown rating of various components in series with a path towards a lower potential. **Your equipment becomes a path when there is a high inductance ground connection.** All this happens in microseconds.

The telephone cable would not need to breakdown to have damaging energy at your equipment. With high earth current circulation from a strike in the telephone cable's vicinity, there could be large amounts of energy coupled to the conductors. The resultant elevated voltages caused by a poor ground path in the telephone room could still cause the above scenario.

The damaged cards in equipment were all related to inputs / outputs, yet the ac power supplies feeding the cards were not damaged. This again points towards twisted pair circuits as the energy path to damaged equipment. The first line of defense is the telco protection panel, but the panel must be connected through a low resistance / inductance conductor to a properly designed ground system. There was no adequate ground available in the telephone room.

A separate low inductance ground conductor must be routed from the telco protection block to a low resistance, fast transient response ground system. Additional protection devices should be considered for critical equipment input/outputs.