Protection for global telephony equipment

Application Note OVR AN005 for OVR TN, OVR SL TN, OVR TNQ, OVR KT1, OVR KT1/PTC, OVR K10T1, OVR K10T1/PTC, OVR TN/RJ11-2/6, OVR TN/RJ11-4/6, OVR TN/RJ11-6/6
This Application Note details advanced surge protection for Central Office and Customer Premise Equipment, covering global equipment specifications, exceeding the high speed requirements of VDSL2+.

Any protector fitted to the telephone system should be ‘invisible’ to the application, and not interfere with its normal operation. They should not clip or limit the voltages that occur in normal system operation, and the bandwidth should be sufficient for existing applications with headroom for system development in the foreseeable future.

In order to fully protect telephony systems, protection must be provided in all connection modes; between lines, and between each line and earth, in both polarities. This is referred to as FULL MODE PROTECTION, and is essential to ensure continuous operation of sensitive or critical electronic equipment.

**Global systems requirements**

In order for these products to be applied anywhere in the world, we need to consider the most onerous voltage and frequency requirements that may exist on a global basis, and ensure that products are able to deal adequately with this.

ABB OVR telephony products have maximum working voltages of 296 V, and are not polarity sensitive. Innovative design techniques allow Furse products to protect very close to this level, providing installations with a high degree of protection.

When we next consider the requirements for the frequency spectrum, we observe that standard Plain Old Telephone Systems (POTS) applications operate up to 300 kHz.

Furthermore, the speeds of digital systems, such as DSL, are affected by the distance from the Central Office (CO) or Public Telecom Operator (PTO).

If we consider typical higher-speed applications where there is fibre supplied to the street cabinet (FTTC) and copper wires to the customer premise, then you might expect maximum speeds of around 80 Mbps within 0.3 km of the cabinet, with bit rates reducing to 60 Mbps at 0.5 km and 28 Mbps at 1km.

VDSL2 using a profile of 17a, has a bandwidth of 17 MHz and delivers up to 100 Mbps.

All ABB OVR telephony protectors have a bandwidth in excess of 20 MHz, so can cover these typical requirements.
Protection against the influences of power sources

Telephony systems cannot operate in isolation from power sources, and in the majority of installations cabling runs directly alongside or near to power sources. This introduces issues with safety and EMC that need to be addressed in order to allow continuous operation of sensitive and critical equipment.

Recognising that there is the potential for the induction of energy from power sources into telephony equipment, and the possibility that mains power could become directly applied onto cabling through fault conditions, additional requirements for testing have been established to represent typical in-service conditions to which the products might be subjected. The following documents stipulate Power/Line Cross and Power Induction tests to be applied:

- ITU-T1 (formerly CCITT2 recommendations K.20, K.21 and K.45
- Telcordia (formerly BELL-CORE, and keeper of the NEBS3 Criteria) GR-1089-CORE
- ANSI TIA/EIA/IS-968-A (formerly FCC5 Part 68)

Power/Line Cross requires the direct application of 110/230 Vac for 15 minutes.

Power Induction requires the direct application of pulses of 600 V, 1 A for 0.2 seconds.

In order to satisfy these strict requirements, ABB OVR innovative ‘low let-through voltage’ technology has been applied to develop protectors incorporating Positive Temperature Coefficient (PTC) components.

These new products can withstand these onerous test levels protecting itself and Customer Premise and Central Office Equipment during the fault. The protector automatically resets itself once the event has passed.

The products currently available with these advanced features are designed to fit inside.

Main Distribution Frames (MDF) LSA-PLUS ‘disconnection modules’, and offer protection for single-pair protection (OVP KT1/PTC) when used together with earth bar OVR KE10, and ten-pair protection (OVR K10T1/PTC) with integral earth connection.

Summary

ABB OVR lightning barriers ensure telephony equipment is repeatedly protected and remains operational during lightning activity. Their advanced performance caters for future advances in telecommunications, providing maintenance free protection that will outlast typical system lifetimes.