

# PBX and Key Telephone Systems

## Application Overview

### Problem/Solution

Both PBX and key telephone systems contain components that may be damaged by overcurrent or overvoltage conditions resulting from installation errors, component failure, or misuse. Some systems use 5V data or control lines in addition to  $-48V_{DC}$  tip-and-ring lines. A short circuit of the  $-48V_{DC}$  line to the data lines can damage voltage-sensitive electronics components. Also, a short circuit of the  $-48V_{DC}$  line to ground may generate excessive current, causing resistors or wiring to overheat or other components to fail. PolySwitch devices may be used to protect against these hazards. Under a fault condition, the PolySwitch device switches to a high-resistance state, protecting the system and its components. When the fault condition and power are removed, the device resets.

### Typical Protection Requirements

Connection of a PBX or key telephone system to the Public Switched Telephone Network

(PSTN) may be made via an analog (POTS) or digital (T1/E1, ISDN, XDSL) circuit. For protection of this external interface, please refer to the relevant linecard application notes in this Databook.

Internal station sets are connected from within the business to the station cards of the PBX. Since most of these lines remain within buildings, they are not subject to the severe lightning and power cross hazards which can be present on the outside PSTN lines; instead, they may be prone to short-circuits from miswiring, component failure, or misuse. Power supplies of 48-60V generating loop currents of 10mA on-hook and 40mA off-hook are typical. Short-circuit currents above this level must be protected against.

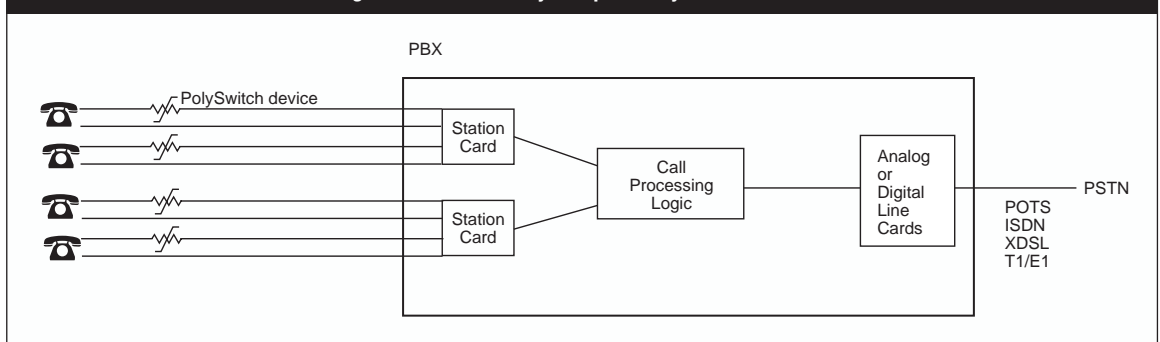
### Device Selection for Agency Approval Requirements

For protection of individual station set lines, both surface-mount and radial-leaded PolySwitch devices are available. For applications

with 60V or lower maximum power supply voltage, surface-mount SMD030, SMD030-2018, SMD050, and miniSMD014 devices or radial-leaded RXE030 and RXE050 devices may be suitable. Consult Section 4 for current and voltage ratings tailored to your application needs.

If the PBX is located in a region where fault susceptibility is deemed high and a more robust circuit-protection solution is desired, PolySwitch resettable devices and SiBar thyristors can be selected which will meet the Telcordia GR-1089 Intrabuilding specification. This specification describes faults that may come from accidental connection to  $120V_{AC}$  household wiring, as well as lightning surges that are less severe than the surges expected on lines connected to the public switched telephone network. If an even more robust solution is desired, overcurrent and overvoltage protection devices can be chosen which will meet the UL60950 and TIA-968-A or the

Figure 2. PBX and Key Telephone System Protection



Telcordia GR-1089 requirements in North America or the ITU recommendations for other regions of the world. Reference diagrams for protection against UL60950, TIA-968-A, Telcordia GR-1089 Intrabuilding and Extrabuilding, and ITU recommendations can be found as separate application notes in this Databook.