

Functions of protective relaying, protective zones, primary and backup protection

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The two most common types of redundancy are dual and parallel redundancy. Dual redundancy is where two identical units are operated with identical inputs. The outputs are placed in parallel for added reliability or in series for added security.

Parallel redundancy uses two units of different design but the two units are functionally equivalent. They may or may not use the same inputs but the outputs are connected as they are in dual redundancy.

Diversity – Overlapping Zones of Protection

Protection systems improve reliability by organizing the protection function with overlapping zones in such a way that each relay has a primary zone and provides backup protection for one or more other expanded zones

Relays frequently have multiple operational zones, as illustrated in Figure 3. The speed of trips for faults in zone two is generally slower to allow opportunities for other relays that see the fault in zone 1 to clear the fault.

Zone 2 therefore provides backup protection by overlapping other zones that are normally protected by other relays. Zone 3 can be used to send signals to block other relays from operating or for reverse direction protection.

The relay is designed to determine which zone of protection a fault is in and provide the proper operation for any fault within the assigned zone or zones. As Figure 1.2 shows, the zones overlap, so more than one relay may operate for a specific fault.

Figure 3 shows how different zones can be assigned for a relay whose primary function is to protect the transmission line between breakers A and B. The different zones usually have different operating times worked out in relay coordination plans.

Figure 3: Zone Assignments for a Three-Zone Relay

