

# "Powering and Protecting Networks and Equipment Connected to It"

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ITW/LINX



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# Table of Contents

I will cover:

- Electrical and Communications Infrastructures that support networks and connected equipment.
- Standards that define the type of threats posed on AC Power and Communications (Cat) lines.
- Guidelines to identify and troubleshoot electrical power or communications line issues in relationship to AC surges, transients and lightning.



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# What is Powering and Protecting?

The strategic application of Surge Protection modules designed to eliminate electrical threats (Lightning, AC Power Induction, Voltage stability, Transients and harmonics) that can destroy or degrade the performance of equipment and networks.

## Why we need it?

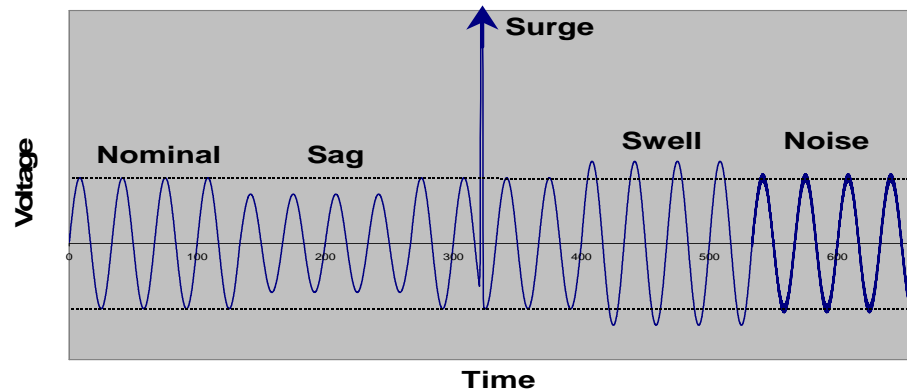
To increase the Reliability and Availability of Equipment and Networks.



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# What is a Surge?

A surge is a very short, very intense burst of voltage, with a duration significantly less than a cycle, and an amplitude significantly above the normal sine wave.



# What is a Surge Protective Device?

Surge Protective Device (SPD) is a stand alone protection module designed to protect sensitive electronic equipment and personnel from destructive transient over voltages originating from lightning strikes and other electrical disturbances.



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# Surge Protective Devices



# Where do Surges Come From?

**External Surges** come from outside the structure due to lightning and power utility equipment operation.

**Internal Surges** are generated within the structure by power being switched on or off in the middle of the sine wave.

Both external and internal surges are present inside the structure. Internal surges are both smaller and more frequent than external surges.



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# What Happens without Surge Protection?

- Destruction
- Disruption
- Degradation and Deterioration



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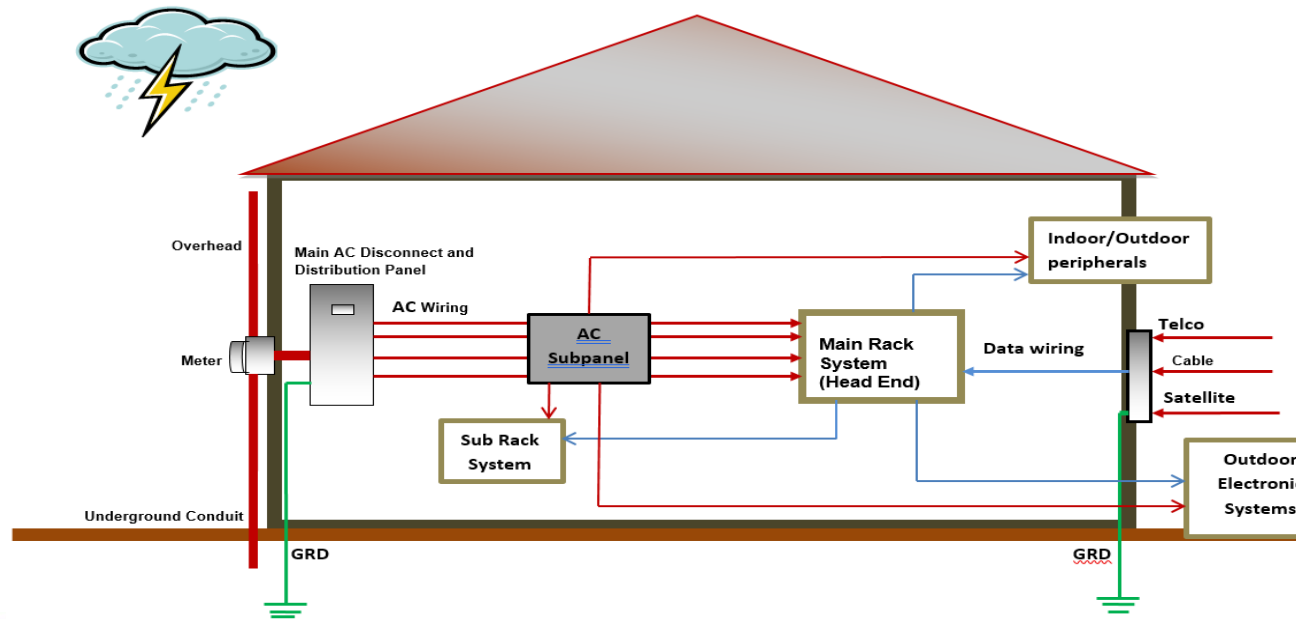
# Business Implications

- Its costs \$\$\$
- Unhappy customers
- Helpless customers
- Non-operational structures (not livable)
- Integrators and Installers lose money and future customers
- Manufacturers lose sales and market position
- Blame goes around with no end
- Warranty and Insurance repercussions
- Credibility



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# Today's Challenging Installations



# Electrical & Communications Infrastructures

## Electrical

- AC Panels & Circuit breakers
- Wiring and Outlets
- Grounding

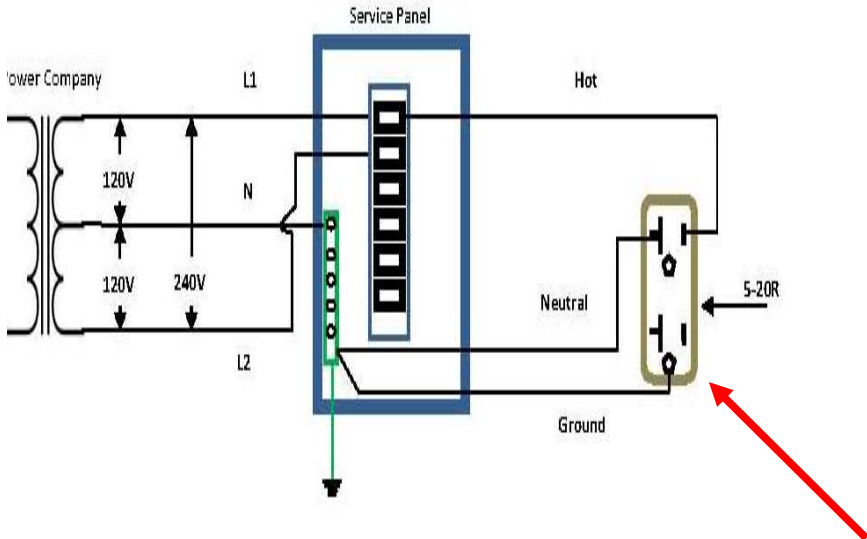
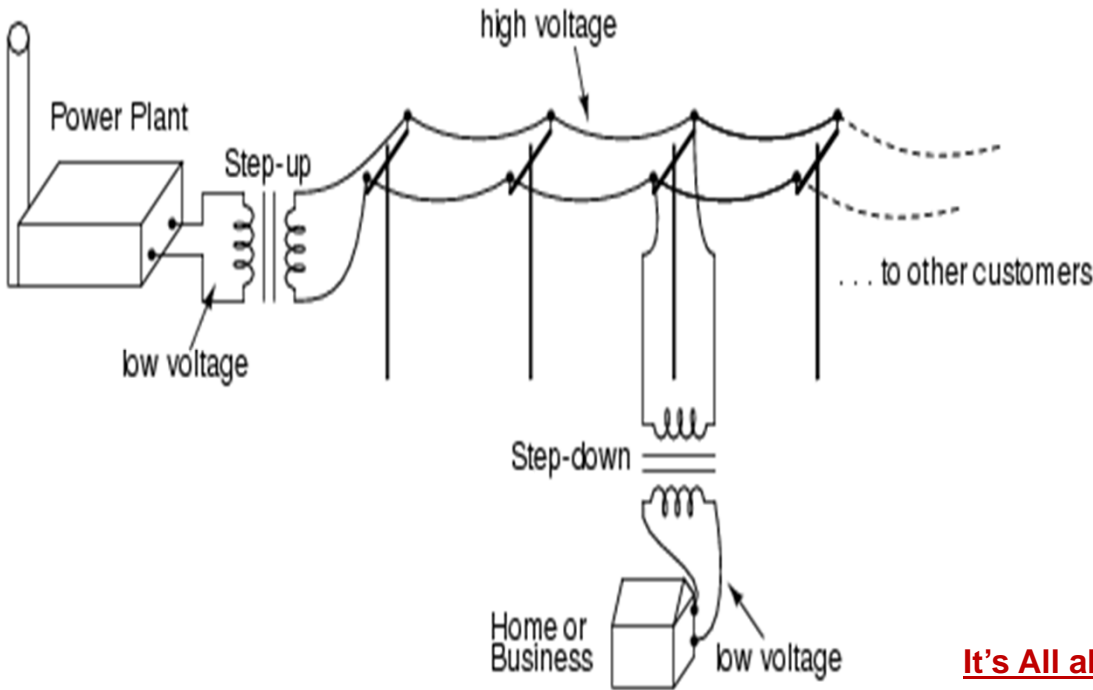
## Communications

- Service Entrance/Building Entrance
- Category cable and fiber optics synergies
- Grounding



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# Electrical Distribution

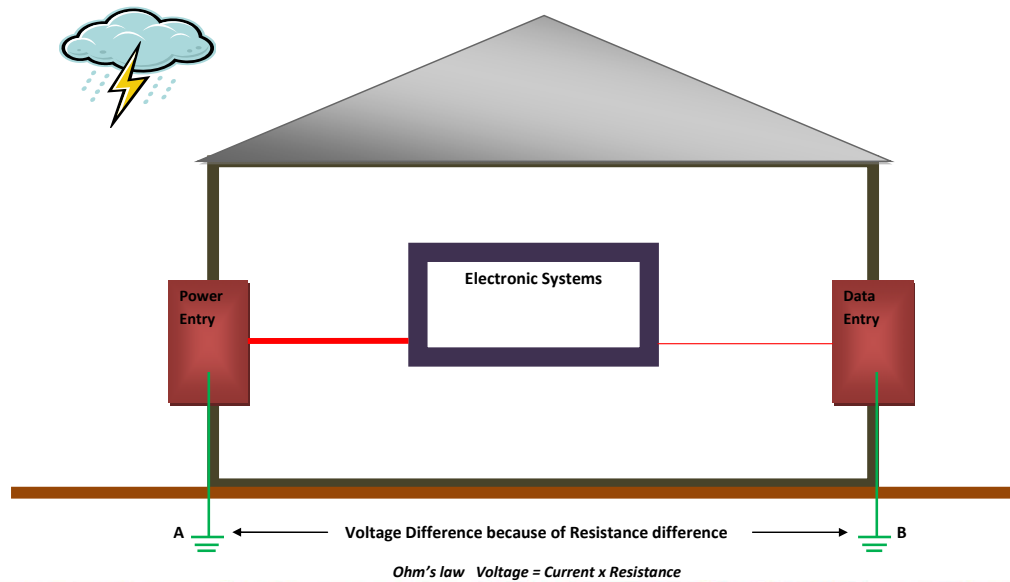


It's All about this AC outlet that delivers Electricity to Equipment



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# Grounding!



# The Ideal Electrical & Communications Infrastructures

## Electrical

- Stable AC Power, Balanced loads, No harmonics.
- Wired per NEC, low Impedance Ground.
- Only One Service Entrance

## Communications

- Connectivity methods and wiring per code and industry standards.
- Grounding
- Outside plant and indoors cable runs protected from (transients, surges, AC induction).



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# Surge Protection for AC Infrastructure

- Cord Connected or Hardwired SPD devices must be listed to **UL 1449**
- Install type 1 or 2 Surge protection at Service Entrance of structure
- Install type 2 Surge protection if Sub-panel powered equipment is further than 30 feet from Service Entrance.
- Install Cord Connected SPD at point of use.
- Before installing **SPD devices verify that AC power and wiring are correct.**



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# Surge Protection for AC Infrastructure (cont.)

Is the Joule rating of an SPD important?

No longer, because SPD's designed and Listed to UL1449 standard are categorized per application (Type1, Type2, Type3) and are tested to specific waveforms to ensure their capability to withstand the Surge exposure in such locations.



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# Surge Protection for AC Infrastructure (cont.)

## Installation guide and Warning

- When installing an SPD make sure the Electrical wiring is wired properly and there is No wiring faults such as: Reversed Polarity, Open Ground, Open Neutral.
- SPD's are designed and tested under the assumption that they will be installed in a Correctly Wired Outlet and Electrical wiring infrastructure.
- Failure to identify and repair incorrectly wired electrical infrastructure can result in an Ineffective Surge Protection, Damaged Equipment, nonoperational networks and Personal Injuries.



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# Surge testing standards

## AC Power Infrastructure

ANSI/IEEE C62.41 Combination Wave (1.2/50us open circuit, 8/20us short circuit)

ANSI/IEEE C62.41 Ring Wave (.5us risetime, 100KHZ frequency)

## Communications infrastructure

ANSI/IEEE C62.41 Impulse wave (10x1000us)



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# Surge Protection for Communications Infrastructure

- Communications Line protectors must be listed to **UL 497 and 497A** for safety.
- Choose surge protectors that are tested and found in compliance to TIA standards for data transmission performance.
- Install UL497 primary protectors on all cables entering/exiting structure.
- Install UL497A Secondary protectors on all indoor cable runs per NEC/NFPA70 article 800



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# Powering and Protecting Basic Rules

1. All equipment must be protected.
2. All power lines, communications/network/data cables entering or exiting the building must be protected.
3. All protected equipment must be grounded to a single point **Ground**.



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# The Perfectly Powered and Protected Network

- Provides stable, controlled and repeatable parameters
- Allows Equipment to operate at their maximum performance levels without degradations
- Transparent to the installers/operators/owners
- Allows for Superior High-Speed Data Performance
- Increases reliability and enhances owners experience
- Lowers maintenance and contracts costs for owners and installers



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# Surge Protection Application Guide

