DATA SHEET

SURGE PROTECTION CABLES FOR SMART SERIAL INTERFACES

Surge events, including ElectroStatic Discharge (ESD) and lightning surges, are common in many parts of the world, especially during electrical storms. These energy surges can damage electrical equipment and lead to network down time. Cisco surge protection cables for Smart Serial interfaces help protect your network from down-time due to these surge events. If you protect your router from surges via the power input (surge protectors, Uninterruptible Power Supplies, or power conditioners), you should also protect your router serial interfaces.

Figure 1. CAB-SS-SURGE Surge Protection Cable

HOW SURGE EVENTS HAPPEN

In a normal equipment environment there are reasonable threats from Electrostatic Discharge (ESD) and lightning transients which can cause loss of data integrity and permanent damage to equipment if not controlled.

ESD threats are generated by personnel movement, which causes triboelectric (rubbing causing a separation of charge) charges to accumulate on equipment or clothing and then be discharged through hand or tool “touch”. This discharge can represent several thousand volts at 10 to 30 amps of current. There are two primary threats from an ESD event. These are the peak current of the discharge and the resulting electromagnetic field. Should the input to the device not be protected from this ESD threat, as little as 100 milli-Joules can cause permanent failure to an input device at the silicon die level.

Lightning also can create a large disturbance and delivery destructive energy to the equipment. These lightning events cause differential voltages to develop as a result of inductance in the protective earth ground path to the equipment. During a direct lightning strike it is possible to measure peak currents into the Kilo Amp range. These events can occur both at the facility as well as outside the facility along utility power lines. When they occur on the power line outside of the facility peak currents can be extended in time due to the additional inductance of the power line. A normal event may be 10 usec zero to peak, with a decay of 200 usec. These currents are called longitudinal. The Cisco surge protection cable will adequately prevent this transient damage from occurring to within the industry standards for lightning protection devices. A good equipment chassis protective ground is strongly recommended to assure adequate protection.

EFT disturbances occur as a result of arcing contacts in electro-mechanical switches and relays commonly found in an industrial environment. The electro-mechanical switches are used to connect and disconnect inductive loads. Like ESD, EFT can be especially fatal on data and I/O lines. The fast rise time of the EFT pulses demand similar protection as ESD pulses.

CONFIGURATIONS THAT ARE SUBJECT TO SURGE EVENTS

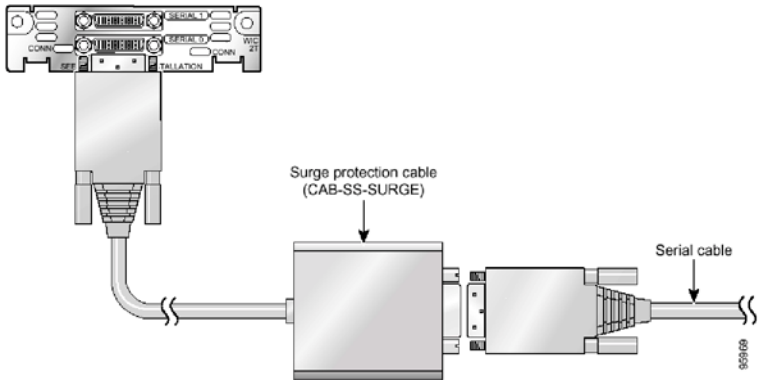
There are several hardware configurations and applications that are more subject to damage from ESD events. These configurations include the following:

- **Locations Subject to Electrical Storms**—Any location where electrical storms are common is a good candidate site for surge protection on the serial ports
- **Unshielded Cables**—If unshielded cables are used to connect to the serial port, it is much more likely that electrical discharges will be picked up by the cabling and damage the serial port.
- **Long Cable Runs**—The longer the cable, the more susceptible it is to surge events, even if the cable is shielded.
- **Outside Wiring**—If the cable runs outdoors, it is more susceptible to surge events.
- **Different Earth Grounds**—If the router and the device at the other end of the serial cable are connected to different earth grounds, then the cable can become a conduit for current that equalizes different ground potentials.
- **Installations with Multiple Serial Port Failures**—If an installation has experienced multiple serial port failures in the past, it is a good candidate for surge protection.

THE CISCO SURGE PROTECTION SOLUTION

In order to improve the network reliability of installations subject to surge events, Cisco offers the CAB-SS-SURGE surge protection cable for Smart Serial interfaces. If a surge event (Lightning/ESD) is coupled onto the cables that interface with the serial card, energy can couple into the transceivers on the front end of the card. The addition of a passive cable assembly (with internal clamping circuitry) can prevent this energy from damaging the transceivers on the front end of the interface. When a voltage over the normal operating levels seen in the serial communication are present on the front end of the interface they are clamped to ground. This cable attaches to the Smart Serial connector on the WIC-2T, WIC-2A/S, HWIC-4T, HWIC-4A/S, or NM-16A/S on the router, and connects to the standard Smart Serial cable on the other end. See Figure 2 for a diagram of how to connect the surge protection cable.

Figure 2. How to Connect the Smart Serial Cable



THE CISCO SURGE PROTECTION ADVANTAGE

Surge suppressors and optical isolators are available from other vendors; however the Cisco surge protection cable has a number of important benefits.

Table 1. Cisco Surge Protection Features and Benefits

Feature	Benefit
Smart Serial Interface	Supports all Smart Serial protocols: EIA-232D, V.35, X.21, EIA-449, EIA-530, and EIA-530A. Third party surge suppressors and optical isolators support a single protocol.
Full Signal Protection	Every signal is protected from surge events. Third party surge suppressors and optical isolators protect a subset of the logic signals
Attaches Directly to the Router	Provides the maximum protection by having the surge protection closest to the port that needs protection. Third party surge suppressors and optical isolators connect to the end of the Smart Serial cable.

ORDERING INFORMATION

Surge Protection Cable Part Numbers

The part numbers for Cisco surge protection cables are shown in Table 2.

Table 2. Cisco Surge Protection Cable Part Numbers

Cable Part Number	Description
CAB-SS-SURGE	Surge protection cable adapter for Smart Serial Cables
CAB-SS-SURGE=	Surge protection cable adapter for Smart Serial Cables, Spare

Supported Serial Interfaces

The CAB-SS-SURGE surge protection cable is supported on the serial interfaces shown in Table 3.

Table 3. Supported Serial Interfaces

Serial Interface	Description
WIC-2T	2-Port Serial WAN Interface Card
WIC-2A/S	2-Port Async/Sync Serial WAN Interface Card
HWIC-4T	4-Port Serial HWIC
HWIC-4A/S	4-Port Async/Sync Serial HWIC
NM-16A/S	16-Port Async/Sync Serial Network Module

Supported Smart Serial Cables

The CAB-SS-SURGE supports all of the Cisco Smart Serial cables shown in Table 4.

Table 4. Supported Smart Serial Cables

Product Number	Cable Type	Length	Connector Type
CAB-SS-V35MT	V.35 DTE	10 feet (3 meters)	Male
CAB-SS-V35FC	V.35 DCE	10 feet (3 meters)	Female
CAB-SS-232MT	EIA/TIA-232 DTE	10 feet (3 meters)	Male
CAB-SS-232FC	EIA/TIA-232 DCE	10 feet (3 meters)	Female
CAB-SS-449MT	EIA/TIA-449 DTE	10 feet (3 meters)	Male

Product Number	Cable Type	Length	Connector Type
CAB-SS-449FC	EIA/TIA-449 DCE	10 feet (3 meters)	Female
CAB-SS-X21MT	X.21 DTE	10 feet (3 meters)	Male
CAB-SS-X21FC	X.21 DCE	10 feet (3 meters)	Female
CAB-SS-530MT	EIA/TIA-530 DTE	10 feet (3 meters)	Male
CAB-SS-530AMT	EIA/TIA-530A DTE	10 feet (3 meters)	Male

PROTECT THE AVAILABILITY OF YOUR NETWORK

Cisco surge protection cables are the smart option to protect your network from outages due to electrical storms and other ESD events.

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