design FAQs

FREQUENTLY ASKED QUESTIONS

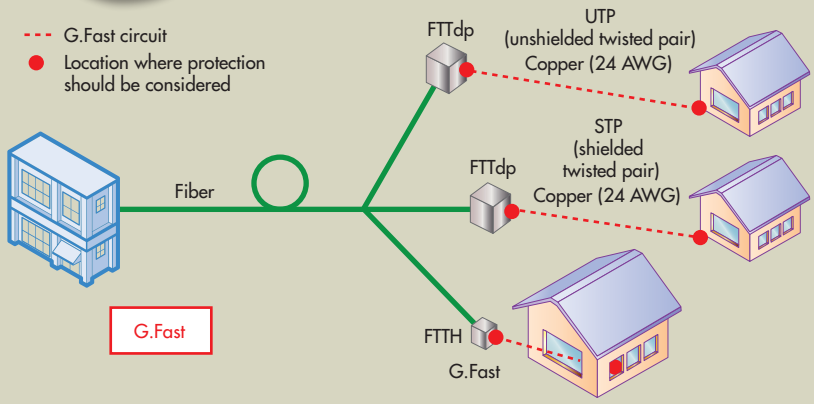
Protecting Distributed Wireless Base Stations and New G.fast Circuits

Q: Service providers have been investing to provide a bigger data "pipe" to their customers. What is driving this activity?

A: There are two key trends driving this: The quantity of mobile devices (smartphones, notebooks, tablets, etc.) that can be used to consume data has grown sharply over the last five years. Also, the types of content being consumed has changed. Not too long ago, we used phones, notebooks, and tablets as though they were simple digital assistants. Now, we've added activities like streaming and uploading high-definition videos, audio, music, etc. These two trends have combined to exponentially grow the data traffic that must be handled by the service providers. They now need to cost-effectively increase their rate and reach to meet the needs of their mobile and wired customers. Two solutions they will use include Distributed Base Stations and G.fast.

Q: What is the greatest electrical threat to keeping Distributed Base Stations in operation?

A: Base stations are located out of doors and can be located in remote and high-lightning areas. A direct or near-direct strike produces such high voltages that damaging currents can flow through the power input lines. These transient voltage surges need to be diverted or clamped to a level that the system can survive. Secondly, short circuits due to power-line accidents or switching transients can also disrupt service.



1. In this implementation, service providers will use existing fiber optic cables to bring high-speed connections to transition points like FTTdp (Fiber To The Distribution Point) and FTTH (Fiber To The Home).

Q: What can be done to prevent system damage during these power surges?

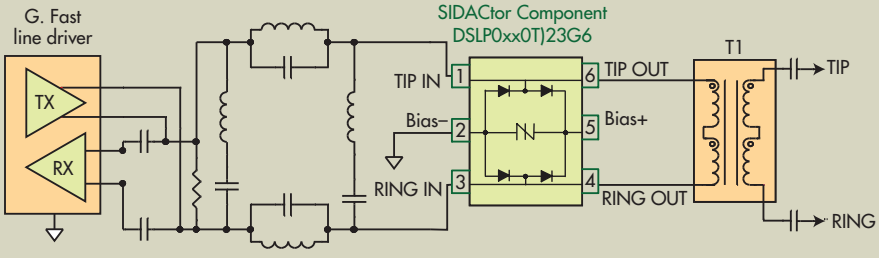
A: One of the simplest and easiest to implement is the use of surge-protection devices at the input stage of the power supplies. These devices will divert the surge energy away from the circuit, as well as clamping the high-voltage spike so that the system will not be brought down. By limiting the surge energy that the system experiences, the prevention of service disruptions, improvement to system reliability, and lower overall maintenance concerns and costs can be realized.

Q: What devices are used for protecting a base station?

A: The most appropriate protection is a combination of fuses and robust clamping diodes that can be installed in the ac power distribution box. One example is the Littelfuse high-power AK/LTKAK series TVS diodes, which offer superior clamping performance over standard silicon avalanche diodes (SAD) technologies. Through the use of the AK/LTKAK series, the voltage rise due to surge currents is contained to a minimum.

Q: What if some base stations are more susceptible to lightning strikes than others?

A: The Littelfuse series of TVS diodes can be connected in series or parallel to create very high-capacity protection solutions. They also incorporate a no-wear-out mechanism, offer faster response times, lower leakage levels, and compact design.



2. The DSLP Biased Series provides a typical surge capacity of 35 Amps (8/20 µs) with only 1.3 pF of typical loading capacitance, and is packaged such that flow-through routing of the data tracks is possible.

Q: What is the new Digital Subscriber Line G.fast protocol?

A: In this new, wired implementation (Fig. 1), service providers will use existing fiber optic cables to bring high-speed connections to transition points like FTTdp (Fiber To The Distribution Point) and FTTH (Fiber To The Home). At these points, fiber will be converted to copper pairs that already exist at the customer location. The copper pairs will then run into the customer premises where they will connect to a G.fast modem, which will provide data connectivity via Fast Ethernet, Gigabit Ethernet, and/or WiFi.

Q: What kind of performance is expected through the use of the G.fast interface?

A: Performance targets depend on the actual loop length, but are aimed at 150 Mbit/s for some very long distances and as high as 1 Gbit/s for close distances.

Q: Why does our telcom company include this new interface instead of bringing the fiber into our home?

A: While fiber provides the highest speeds, installing these cables is extremely intrusive to the property and building, as well as expensive. Implementing G.fast allows the service providers to use existing plant to minimize costs and intrusions.

Q: What types of protection do I need against surge transients?

A: This depends on the needs of the applications and the type of communication line being used (xDSL vs. G.fast). Littelfuse offers a number of products for overvoltage/surge protection of all flavors of DSL, and the new G.fast protocol. Examples include the DSLP Biased Series, which provides a typical surge capacity of 35 Amps (8/20 µs) with only 1.3 pF of typical loading capacitance, and is packaged such that flow-through routing of the data tracks is possible (Fig. 2). The SDP Series of protection thyristors provides tertiary or line-driver-side protection up to 15 amps (5/310 µs), and the SDP Biased Series provides protection up to 50 amps (8/20 µs). In addition, for regions with extremely high surge events, the semiconductor protection can be complemented with the use of Gas Discharge Tubes at the Tip/Ring input. They will intercept the surge transients and dissipate the energy to a level that the system and semiconductor protection devices can reliably handle. ■

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