

## Do I need a CSU for my T1?

### What Is a CSU?

A CSU, or Channel Service Unit, is a compact piece of customer premises equipment that can be installed inline on a T-1 trunk immediately in front of a network interface device such as the Brooktrout TRNIC+I24T. The range of functions that a CSU may perform varies widely, but at a minimum it provides line conditioning, loopback and diagnostic capabilities. The signals present on a T-1 are susceptible to distortion as loop length increases and various types of interferences are encountered. The CSU reinforces these signals, keeps track of errors, and provides test modes to help resolve line problems. Another important function that many CSUs provide is called "keep alive" which, as the name implies, will keep the T-1 link up even if your network interface device goes down. This helps to avoid calls to your carrier to ask them to re-enable a T-1 that they shut down when they detected a problem with your equipment.

CSUs are available from a variety of manufacturers in both rack-mount and free-standing configurations. Prices typically range from \$500 - \$1000 depending on features. Oftentimes the company where the T-1 is being installed will have a preferred CSU; at other times the carrier providing the T-1 will offer a recommendation. Otherwise, CSU's such as the TServerII from ADC/Kentrox can be purchased from suppliers like Graybar for about \$800 (don't forget the power supply).

### What Is Not a CSU?

There is a great deal of feature overlap between CSU's and other devices. Here are a few such devices that you may encounter:

A DSU, (**D**ata **S**ervice **U**nit), is a device that converts a digital signal from another format such as serial to the bipolar format used by T-1. This function is not normally needed outside of the data world since telephony interface boards produce a signal that is already in T-1 format. Many CSUs, however, have DSU functionality built in and are thus referred to as CSU/DSUs.

A "smart jack" is a device increasingly used by carriers as their demarcation point. This device, like a CSU, provides diagnostic/loopback functions that the carrier can control remotely. Unlike a CSU, however, a smart jack does not provide line conditioning.

A repeater is a device that digitally regenerates a T-1 signal. It is used at one-mile intervals along a copper T-1 land line. It is a dumb device that neither monitors the T-1 signal for errors nor has loopback capability. Every CSU contains a built-in repeater.

### When Do I Need a CSU?

The short answer to this question is, "Unless you're connected to a PBX, you need a CSU." However, in many cases a CSU may not be strictly necessary. Consider the following points when making a decision about a particular installation:

The primary factor driving the need for a CSU is the loop length, or the distance from the network interface to the source of the T-1 signal, which can be a PBX, a central office switch, or a repeater. If that distance is more than about 500 feet, a CSU may be required in order to maintain a clean signal. This rule is not as straightforward as it sounds, however, because it is often difficult to determine loop length. You can't simply measure "as the crow flies", because the wiring may take a very roundabout path from point A to point B.

Another factor to consider is that you may have a hard time getting help from your carrier unless a CSU is in place. If you call to report a problem and you're not using a CSU, oftentimes the first thing they'll tell you is to install one and see if the problem goes away.

If the problem remains after the CSU is installed, you will at least have a device that can generate some data to help determine the nature of the problem.

Finally, the CSU provides a degree of isolation between the network and your interface device. Burnt-out line drivers on network interface cards are not unheard of, and the causes of this can range from lightning strikes to poor quality lines. A CSU is usually easier and cheaper to replace than a network interface card.

So, there are a number of situations where you can get away with not having a CSU. Like a filtered and surge protected power strip, however, a CSU provides relatively inexpensive insurance against a variety of problems when the quality of your T-1 trunk is unknown, which is most often the case unless you're directly connected to a PBX in the same room.