

# Going the distance and eliminating ground loops with Cat-5 and Cat-6

*Words by Vlado Damjanovski, images and specifications by Practel*

In many CCTV installations which use coaxial cables (and majority of them do) one of the most common problems are ground loops. You can't predict them, you can't easily find the source, and what's even worst, they change throughout the day or the week, as they depend on the current flow in the cables that caused such an induction, and this can change depending on the power consumers in the area.

Ground-loop problems are even more prominent in systems with DVRs because they are more sensitive to video signal inconsistencies, when compared to analogue monitors.

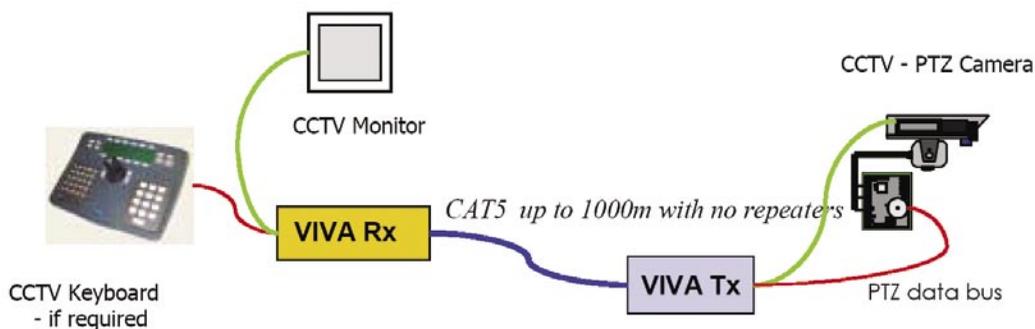
If you can't afford fibre optics transmission, which is the best solution for ground-loopless and long distance video transmission, the next best choice is **twisted pair video**. Twisted pair, also known as balanced video, is conceptually different to the coaxial cable transmission because it does not connect the grounds on both ends of the source (camera) and the recipient (DVR).

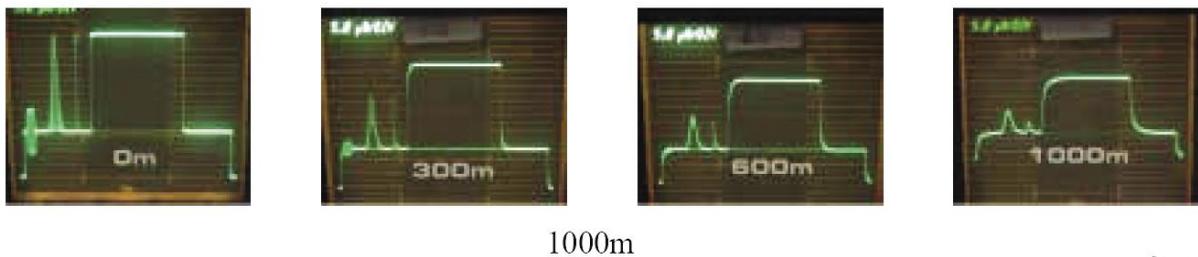
Twisted pair video transmission has been known for quite some years, and while in the past twisted pair equipment was bulky, expensive, and of not so good quality, these days twisted pair video products are much better quality and more affordable.

More importantly, the twisted pair cable is now much better quality than 10 years ago, and not only it is more affordable, but you can now find it almost everywhere - the popular Cat-5, Cat-5e and Cat-6 as used in networking. This is exactly the cable that is designed with all the specific requirements perfectly suited for twisted pair video, as the Ethernet "Cat" cabling uses the same balanced transmission principles.

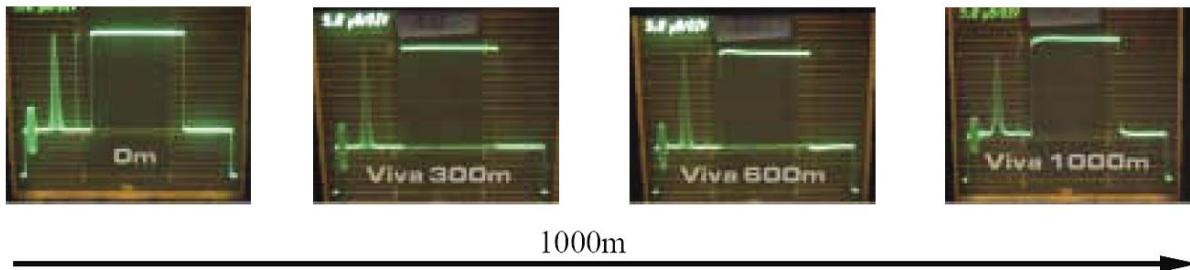
The Viva (Versatile In-line Video Amplifier) is an Australian inexpensive solution designed to extend the useful distance between a camera and a monitor over Cat-5, Cat-5e or Cat-6, beyond the range of coaxial cables.

Inline Video Amplifier for 1000m of Cat-5 cable





Typical 2T Pulse-Bar VIVA signal attenuation without compensation adjustment



Typical 2T Pulse-Bar VIVA signal attenuation with compensation adjustment

This little practical device, in addition to having such an excellent characteristic over twisted pair cable, also does boost the signal over the coax, if wanted. So, basically, it plays the role of in-line amplifier/equaliser.

When used as an in-line (coax) amplifier, the video signal can be boosted (with gain and cable compensation) for up to 1600m of RG59, while up to 1000m can be achieved when using Cat-5. The Cat-5e, and better still Cat-6, cables have better characteristics, and it should take the twisted pair video even further than the 1000 m.

The Viva is an active device, hence it requires power, and this can be either AC or DC over a wide voltage range, supplied via an external plug pack.



If using Cat-5 as a backbone cable, the additional pairs can be used to power the remote Viva and/or to supply power to the camera.

Because in a typical Cat cable there are 4 twisted cable pairs, one of which is used for the video, the other can be used for the remote Viva power, the spare pairs can be used to supply telemetry information to PTZ receivers.