About...

ECCO and ECCO+

FAR BEYOND THE CAMERA LINK LIMIT

DO YOU NEED CAMERA LINK CABLES LONGER THAN 10 METERS?

The ubiquitous Camera Link standard offers many advantages to machine vision solution providers. Today, its strongest advantages are the many Camera Link compliant components available, the robustness and the price. The limitation has been the cable length as some applications require more than 10 meters (or more than 6 meters, in case of 85MHz cameras) between the camera and the host computer in applications such as robotics, web inspection, and flat panel display inspection.

MANY STANDARDS ARE AVAILABLE BUT ...

Going beyond the 10 meters with Camera Link can be challenging and expensive with existing solutions. System integrators can choose from a plethora of standards such as GigE Vision or the new standard - CoaXPress. GigE Vision is a viable candidate, but with an 80MB/s bandwidth limitation it is not a viable solution for high-end applications. As for CoaXPress, it is an evolving standard with limited availability and currently expensive. To go beyond 10 meters with Camera Link used to mean utilizing expensive options such as repeaters and fiber optics, but now there is a more cost effective option called ECCO. With ECCO you can go beyond the Camera Link specification while taking advantage of high bandwidth, stability, and predictability benefits of Camera Link.

WHAT IS ECCO?

ECCO means 'Extended Camera Link Cable Operation', and Euresys developed it to address the cable length problem. Capitalizing on over 20 years of developing frame grabbers Euresys added this innovative feature to the latest generation of Grablink frame grabbers: Grablink Full XR, Grablink Full, DualBase, and Base. The 3rd generation Grablink frame grabbers include the latest features used in machine vision today and ECCO. With ECCO, Euresys has achieved a level of performance that is unique for a Camera Link frame grabber. We have entirely redesigned the Camera Link input stage using the latest technologies.

HOW DO ECCO AND ECCO+ WORK?

Camera Link cables use a number of lanes to transfer data signals from the camera to the frame grabber. As cables are not perfect, the propagation times of the data signals may differ between the lanes. This difference is called "skew" and **the longer the cable the higher the skew**.

ECCO and ECCO+ use an onboard skew compensation technique between the Camera Link data lanes and the clock that more accurately samples the data signals. With ECCO and ECCO+, Grablink frame grabbers are more tolerant to skew and support longer or lower quality Camera Link cables.

Furthermore, ECCO+ uses advanced signal equalization technologies to restore the signal integrity. Equalization is the process of adjusting the balance between frequency components within an electronic signal. Available on the Grablink Full XR only, ECCO+ further stretches the capabilities of the Camera Link standard.

FAR BEYOND THE CAMERA LINK LIMIT

ECCO and ECCO+ allow the Grablink boards to go far beyond the Camera Link limit in terms of cable length or speed performance **using standard Camera Link cables and standard Camera Link cameras**.
Depending on the clock frequency and the cable quality, which can drastically vary from one cable to another, **ECCO allows the new Grablink boards to work with cable lengths of at least 30% in excess of those specified by the Camera Link standard** as well as in excess of those acceptable by the other boards with a "conventional" implementation of the standard. Other ways to take advantage of ECCO would be to keep the same traditional cable length but to achieve 30% higher speed or even to simply use less costly cables.
The increase in performance from ECCO is dependent on which configuration of the standard used, and it is possible to achieve even more than a 30% performance improvement when using Base and Medium Camera Link.
ECCO+ achieves impressive results **simply doubling the possible cable length** compare to the distance recommended Camera Link by the standard.
This is represented in the graphic hereunder.

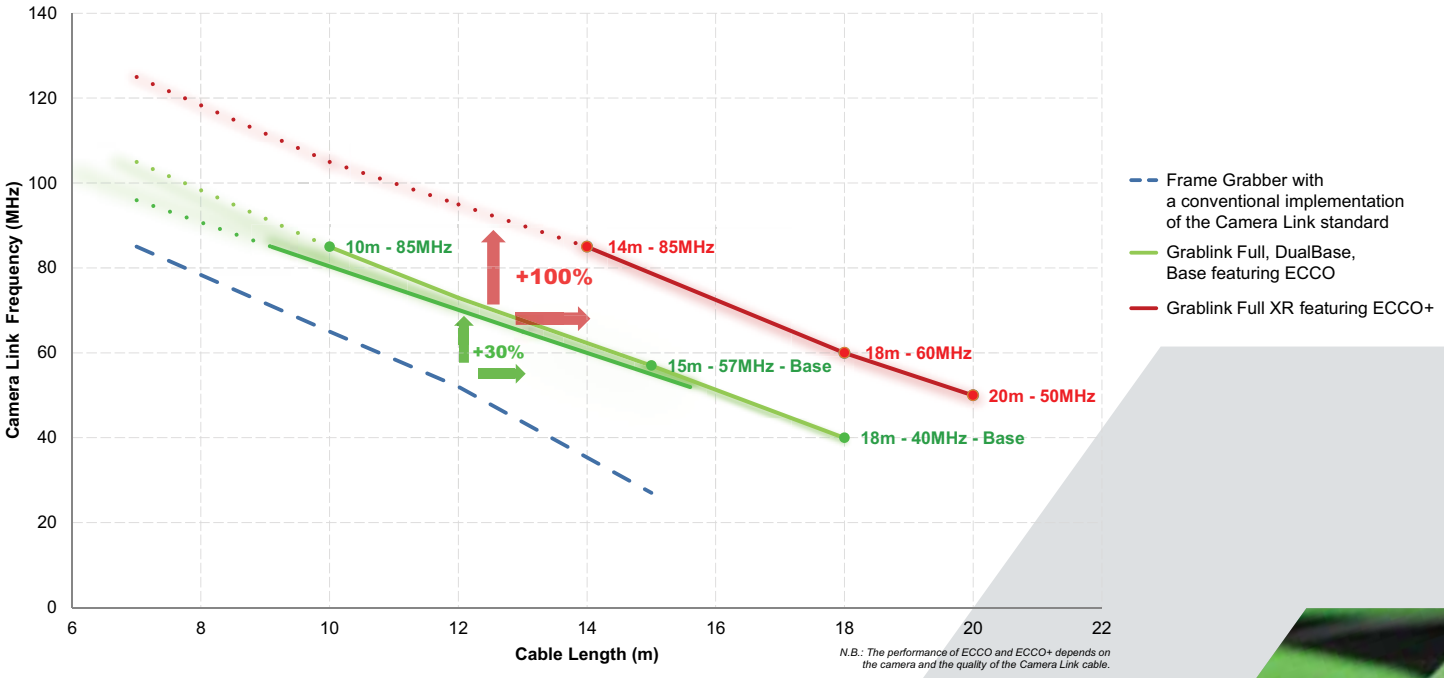
A PRACTICAL EXAMPLE

The Camera Link standard defines that with a sampling rate of 85MHz, the maximum cable length is 5.9 meters and the maximum skew allowed in the cable is 50ps/m. With a Grablink board using ECCO, the cable length can be extended from 5.9 meters to 10 meters, even if the total skew introduced by the cable is as high as 750ps (75ps/m). In other words, with a low-quality 10 meter Camera Link cable exhibiting a skew of 750ps (which is 50% more than the 50ps/m skew allowed for cables by the standard), the maximum clock frequency of 85MHz can be reached! All the more impressive given the fact that a "conventional" implementation is not likely to support cameras with a pixel clock frequency higher than 65MHz.
When using the Grablink Full XR with ECCO+, 85MHz cameras can be used with a cable as long as 14 meters!

HOW CAN I BENEFIT FROM THE ADVANTAGES OF ECCO AND ECCO+?

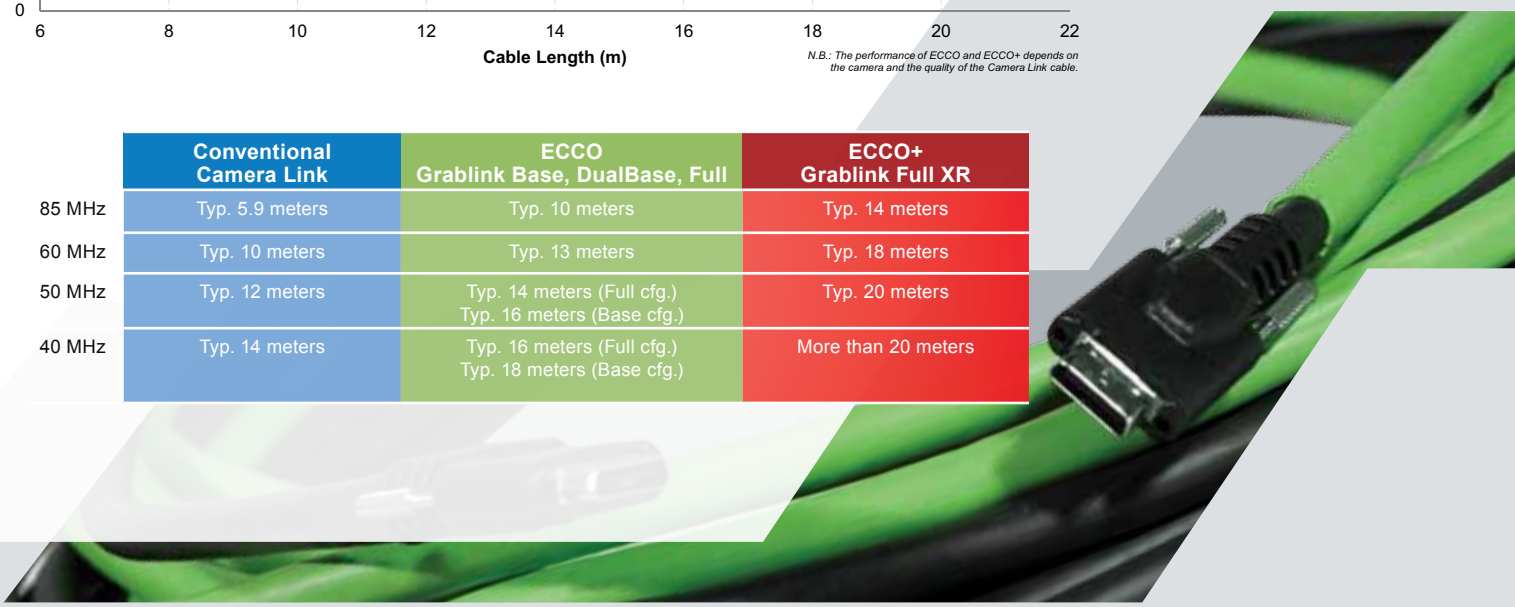
ECCO is available on the Grablink Full, Grablink DualBase and Grablink Base. It is automatically activated on these boards when using Multicam v6.7.3 or later.
ECCO+ is available on any Grablink Full XR. Using ECCO or ECCO+ does not require any specific Camera Link cable or Camera Link camera.

CAMERA LINK FREQUENCY VS CABLE LENGTH WITH GRABLINK BOARDS FEATURING ECCO AND ECCO+



N.B.: The performance of ECCO and ECCO+ depends on the camera and the quality of the Camera Link cable.

	Conventional Camera Link	ECCO Grablink Base, DualBase, Full	ECCO+ Grablink Full XR
85 MHz	Typ. 5.9 meters	Typ. 10 meters	Typ. 14 meters
60 MHz	Typ. 10 meters	Typ. 13 meters	Typ. 18 meters
50 MHz	Typ. 12 meters	Typ. 14 meters (Full cfg.) Typ. 16 meters (Base cfg.)	Typ. 20 meters
40 MHz	Typ. 14 meters	Typ. 16 meters (Full cfg.) Typ. 18 meters (Base cfg.)	More than 20 meters



America | **Euresys Inc.**
27126B Paseo Espada, Suite 704
San Juan Capistrano | CA 92675 | U.S.A.
Toll free: 1.866.387.3797 | Phone: 1.949.743.0612
Email: sales.americas@euresys.com

Asia | **Euresys Pte. Ltd.**
750A Chai Chee Road | #07-15 Technopark @ Chai Chee
Singapore 469001
Phone: +65 6445 4800
Email: sales.asia@euresys.com

Japan | sales.japan@euresys.com
Europe | **Euresys s.a. Corporate Headquarters**
14, Avenue du Pré-Aily | 4031 Angleur | Belgium
Phone: +32 4 367 72 88
Email: sales.europe@euresys.com