

Integrating Gigabit Ethernet Cameras into EPICS at Diamond Light Source

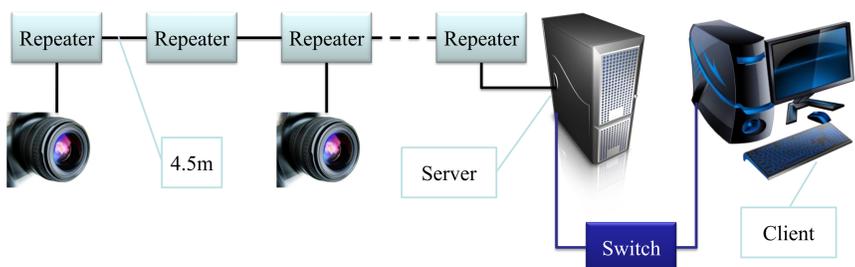
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At Diamond Light Source we have selected Gigabit Ethernet cameras supporting GigE Vision for our new photon beamlines. GigE Vision is an interface standard for high speed Ethernet cameras which encourages

interoperability between manufacturers. This paper describes the challenges encountered while integrating GigE Vision cameras from a range of vendors into EPICS.

Firewire vs. GigE

Firewire requires complex cabling with multiple repeaters chained together. Diamond has used both a licensed Firewire stack running under vxWorks and an open source Firewire stack running on Linux, but both implementations have been somewhat unreliable, especially when running at 800Mbit/s over 10m cables.



Gigabit Ethernet cameras allow up to 100m data transfer lengths, with greatly simplified cabling. Connecting additional cameras at a later date is also simpler



Camera models and specifications

Manta	G-125
Resolution	1292 x 964
Sensor	Sony ICX445
Sensor Size	Type 1/3
Cell size	3.75 μ m
Max frame rate at full resolution	30 fps
A/D	14 bit
On-board FIFO	32 MB
Bit depth	8-12 bit
Power requirements (DC)	8 V - 30 V
Power consumption (12 V)	<3.6 W
Body Dimensions (L x W x H in mm)	86.4 x 44 x 29 mm incl. connectors

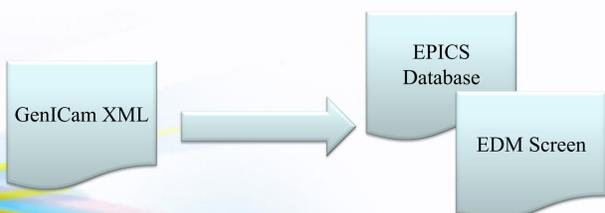
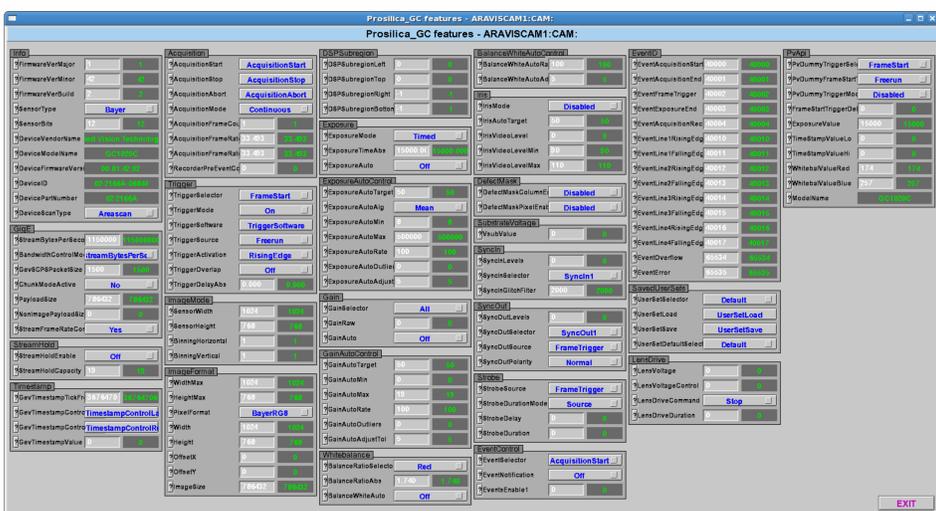


Prosilica GC	1020
Resolution	1024 x 768
Sensor	Sony ICX204
Sensor Size	Type 1/3
Cell size	4.65 μ m
Max frame rate at full resolution	33 fps
A/D	12 bit
On-board FIFO	16 MB
Bit depth	8/12 bit
Power requirements (DC)	5-16 V
Power consumption (12 V)	2.9 W
Body Dimensions (L x W x H in mm)	59 x 46 x 33 mm incl. connectors

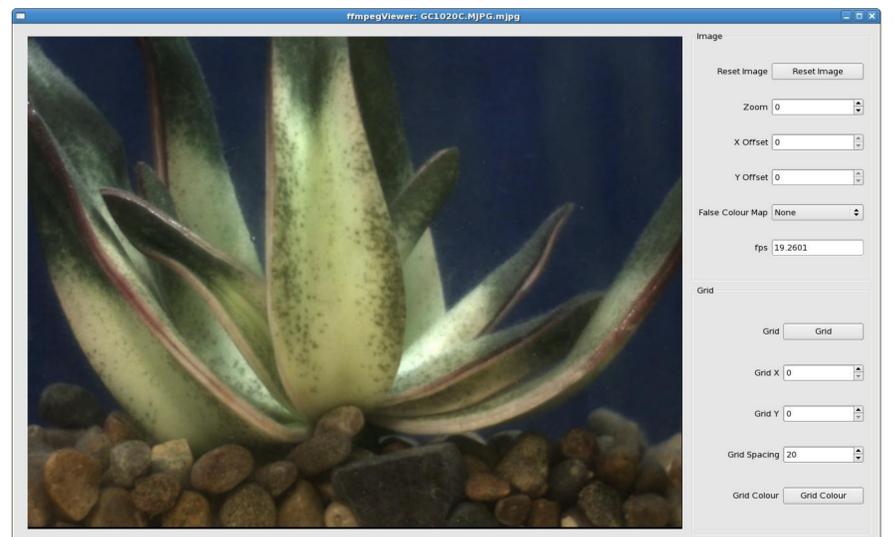


Cameras from different manufacturers

Most Gigabit Ethernet cameras conform to the GigE Vision® standard, which uses the GenICam™ standard to describe the features supported by the camera. The GenICam standard provides a common interface to many different types of cameras, across different vendors and even across different physical connections types. The camera provides an XML file which describes the features that it supports, and how they map to registers on the device. This can be used to produce the EPICS database and EDM Screen. The open source driver Aravis provides the low level driver support for communication with the camera



User interface



The areaDetector module provides a common interface for all supported 2d detectors. Integrating the camera into areaDetector allows image processing and analysis plug-ins to be chained together at runtime, such as the NDStats plug-in for statistics, or the ffmpegServer plug-in to provide a compressed mjpg stream for visualisation

