ATCA-Based Beam Line Data Software for SLAC's LCLS-II timing system

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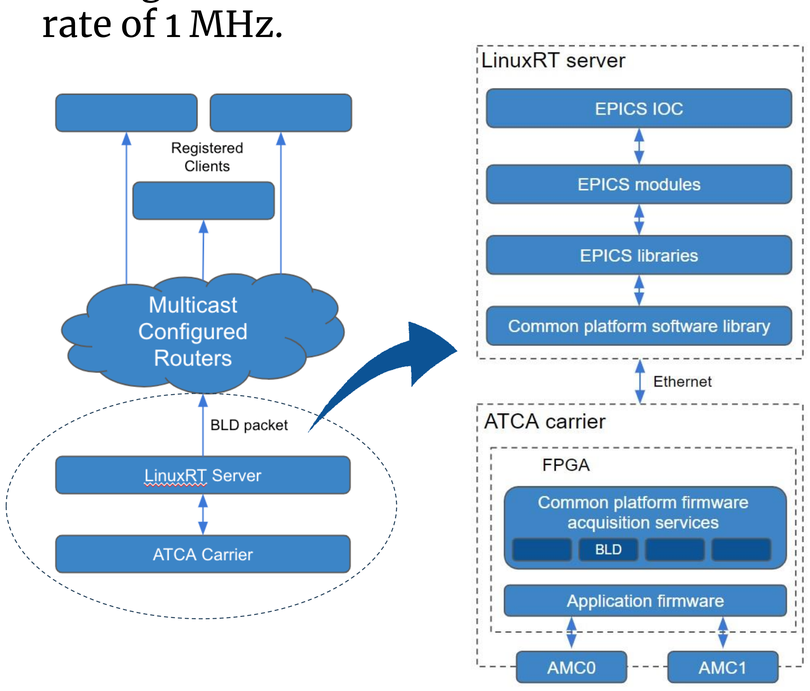
ATCA-BASED LCLS-II BLD ACQUISITION SERVICE

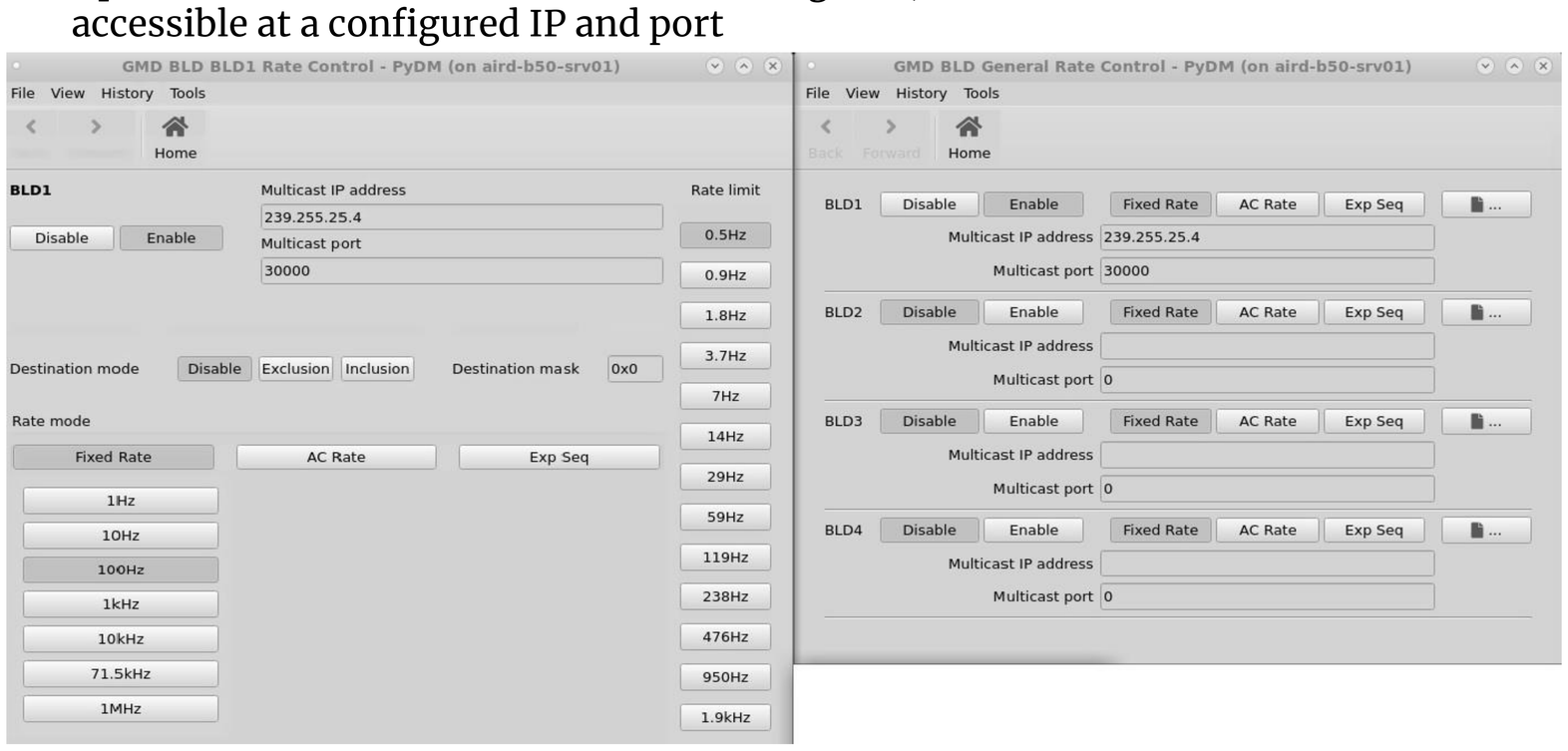
This Acquisition Service permits the forwarding of acquired, processed, and timestamped data in the ATCA to configured IP addresses and ports in the format of multicast network packets through a LinuxRT server with a maximum rate of 1 MHz.



BLD EPICS ASYN DRIVER

The BLD EPICS[1] Asyn Driver[2] support package initializes the BLD firmware and instantiates the upper software stack providing a set of PVs that access the API to control the hardware and to operate the BLD service, namely:

- Enable/disable the transmission of up to 21 32-bit processed data variables
- Up to four BLD rates can be configured, accessible at a configured IP and port

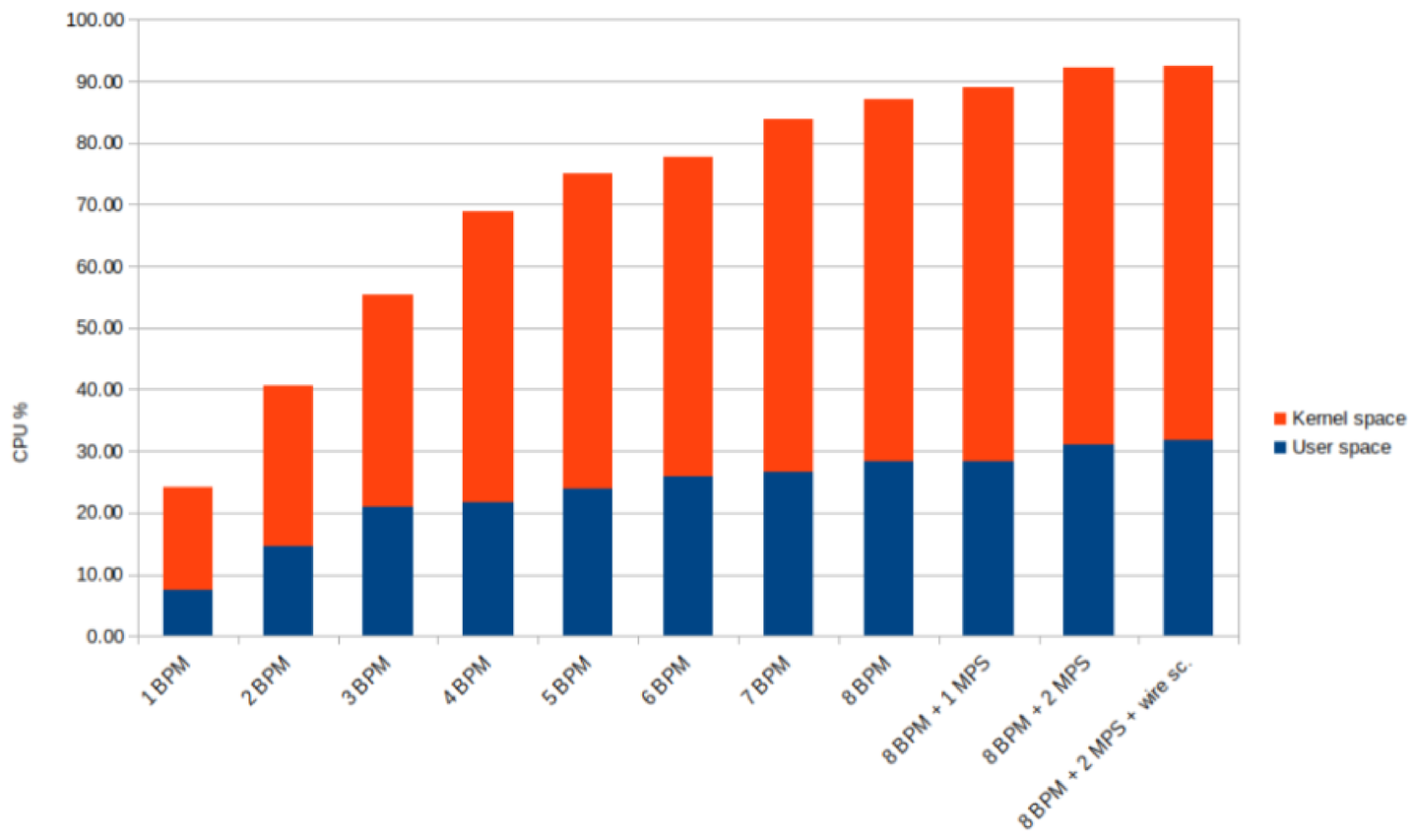


PERFORMANCE

For each packet coming from firmware, four packets to four different destinations will be transmitted (given that the BLD rates of all four are identical). This may saturate bandwidth easily and has serious consequences if BLD is not tuned carefully.

Number of 32-bit variables	Estimated required upstream bandwidth (Mbps)
3	736
4	858
5	981

For one single IOC, approx. 20% of the CPU time is dedicated to packet reception and multicast packet generation, and another 16% is spent in the kernel when transmitting the data over UDP. On saturated servers with more than 6 IOCs and having more than 3 running BLD, CPU hogging is observed.



CONCLUSIONS

Up to four BLD rates can be configured simultaneously, each accessible at its configured IP destination and port, with a maximum rate of 1 MHz. Up to 31 32-bit processed data variables can be sent upstream per event. If proper care is not taken when tuning BLD, the upstream network bandwidth may get saturated easily, as well as the CPU usage.

ACKNOWLEDGEMENT

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REFERENCES

[1] *EPICS*, https://epics-controls.org
[2] *asynDriver*, https://epics.anl.gov/modules/soft/asyn/R4-38/asynDriver.html