

# SLAC ATCA Scope Upgrading the EPICS support package

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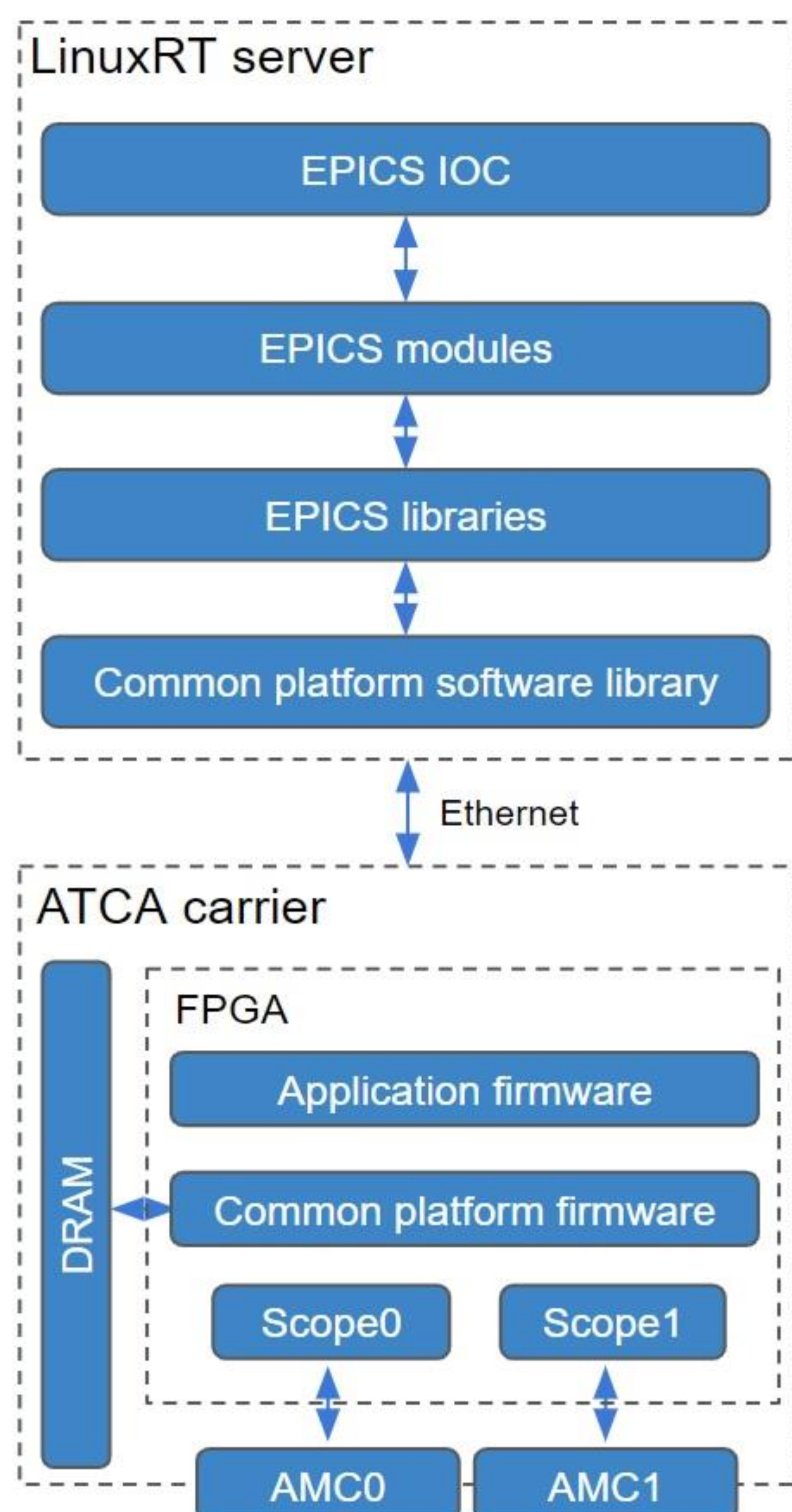


## ATCA 4-CHANNEL DUAL OSCILLOSCOPE & UPGRADE

Having FPGA-level visibility in SLAC's high performance systems (HPS)[1] is essential for obtaining raw data, debugging, and analysis. A standard FPGA firmware component to receive streams, encapsulate them, and send them upstream was developed and integrated into all HPS. This component also requires easy-to-use software resembling an oscilloscope as much as possible.

## HPS OVERVIEW

Each AMC card is linked to a Scope component in the firmware, where most streams passing in and out of the AMC are fed into the Scope EPICS module.



## ACKNOWLEDGEMENTS

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## SCOPE EPICS ASYN DRIVER

Adding the EPICS module to an IOC is straightforward. The ATCA Scope support package works for all HPS with the Scope common firmware implemented in its FPGAs. The Scope Asyn Driver and package initializes the Scope firmware and instantiates the upper software stack providing a set of PVs (EPICS process variables) that access the API to operate the oscilloscope.



Resembles a real oscilloscope:

- Choose probe source
- Flexible acquisition window size
- Single or continuous arm trigger
- Force trigger
- Perform downsampling w/ or wo/ averaging

## INSTANTIATION

```

# 10000 samples of int32
scopeAsynDriverConfigure("atea_str0",
    1, "int32", "10000")

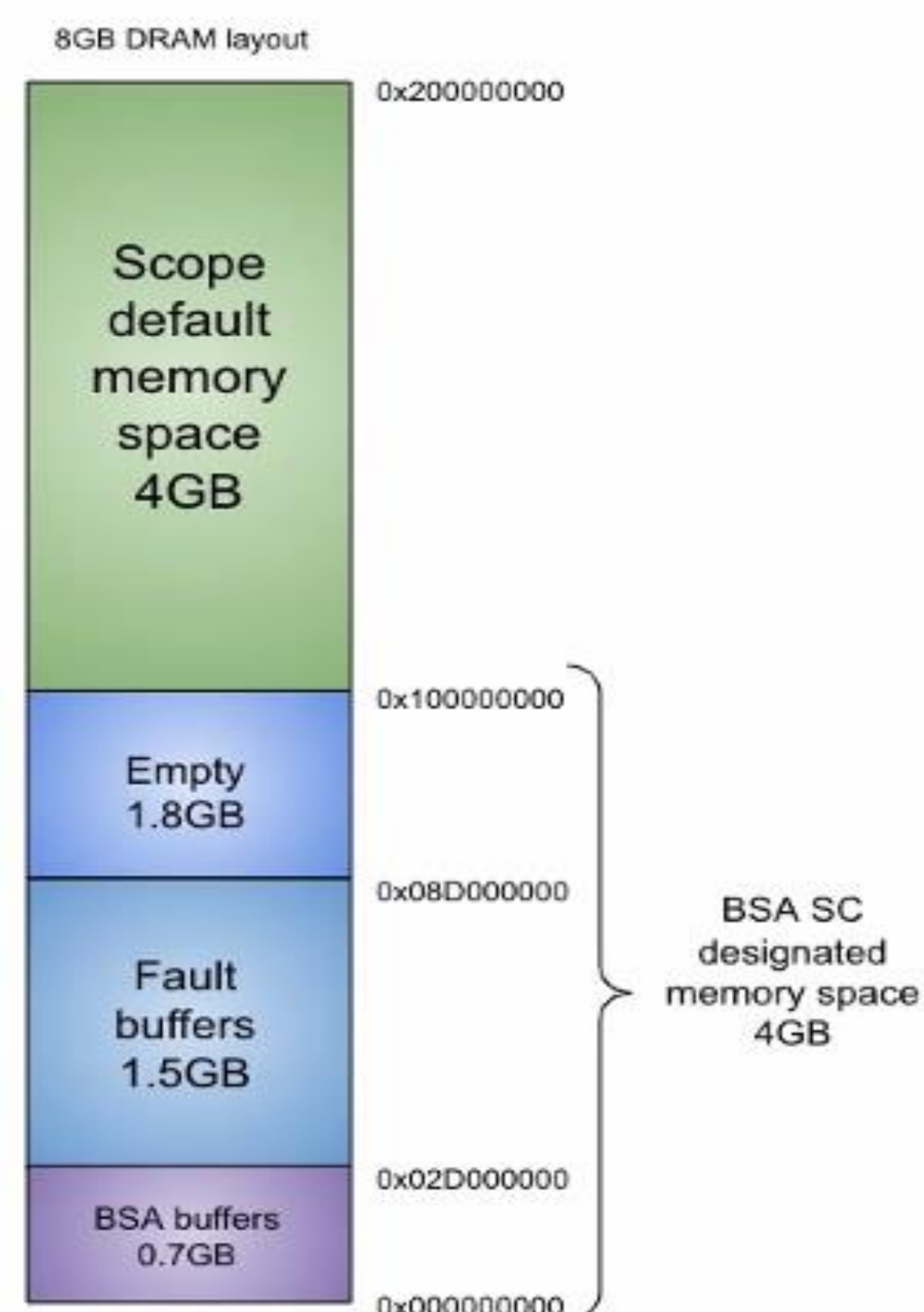
# 10000 samples of int16, no matter the
# types of individual waveforms
scopeAdvancedAsynDriverConfigure("
    atea_str1", 1, "int32", "int32", "
    int32", "int16", "10000")
  
```

## REFERENCES

- [1] T. Straumann et al., "The SLAC Common-Platform Firmware for High-Performance Systems," in Proc. ICALEPCS'17, Barcelona, Spain, Oct. 2017, pp. 1286-1290. doi:10.18429/JACoW-ICALEPCS2017-THMPL08
- [2] K. H. Kim, S. Allison, T. Straumann, and E. Williams, "Real-Time Performance Improvements and Consideration of Parallel Processing for Beam Synchronous Acquisition (BSA)," in Proc. ICALEPCS'15, Melbourne, Australia, Oct. 2015, pp. 992-994. doi:10.18429/JACoW-ICALEPCS2015-WEPGF122

## MEMORY RESOURCE MANAGEMENT

The API also handles intelligently all other complex configurations that should be hidden from users, including the DRAM layout for both Scopes without user intervention or knowledge, allowing acquisitions of up to 8 GBytes per trigger. Before the upgrade, users needed to set the DRAM layout manually while avoiding conflicting regions of the memory. The new version of the Scope takes care of configuring the right amount of memory in the right regions avoiding overwriting the BSA[2] region with data from the waveforms.



## CONCLUSIONS

The software was completely refactored to improve the usability for EPICS IOC engineers and users. Now very few essential configurations are required to operate the Scope and are similar to those of a real oscilloscope. Scope operation via user interfaces enriches the user's seamless overall experience.