

### Precision Timing in AI/ML Offload Engines

AI/ML workloads in datacenter applications are increasingly being offloaded to flexible FPGA-based subsystems. These FPGA-based AI/ML offload engines are more power and compute efficient compared to GPU based systems.

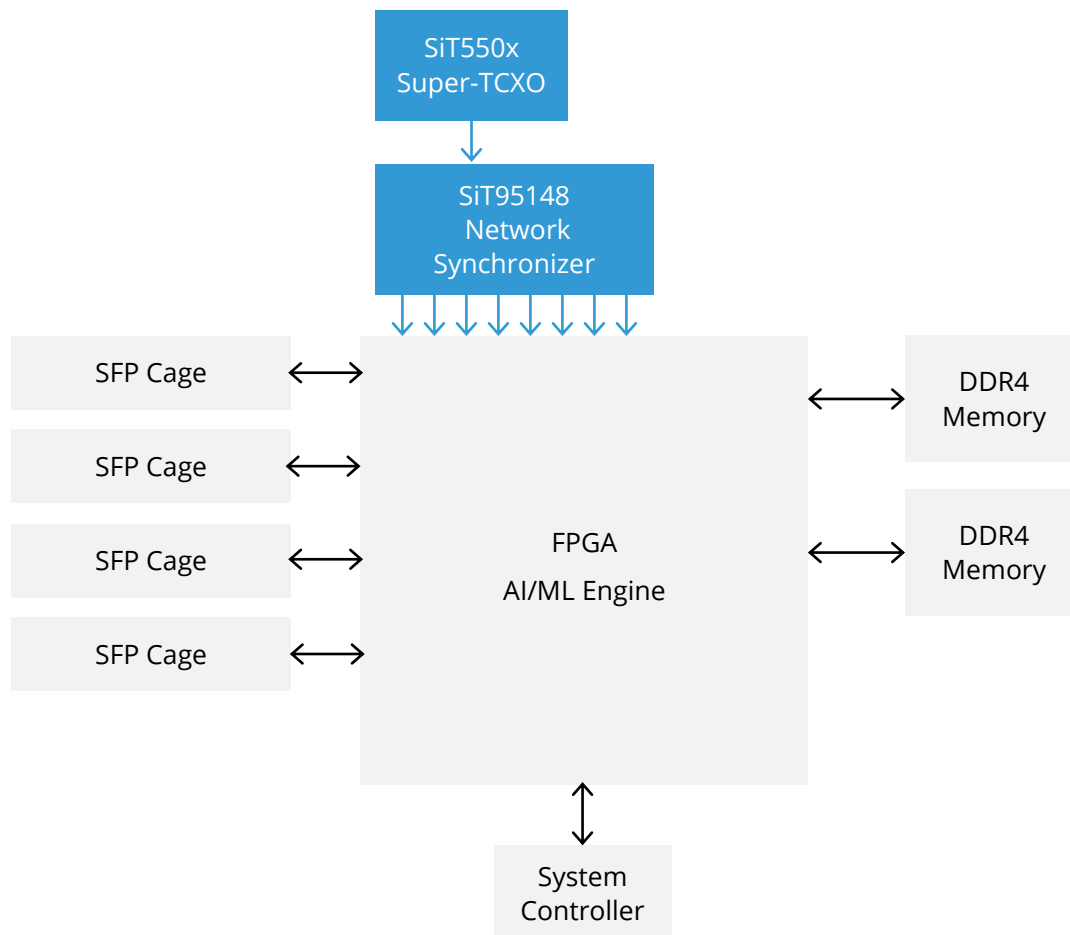
### Key Considerations

- Frequency stability
- Harsh environment
- Low jitter
- Multiple clock domains

Offload engines are special-purpose hardware platforms for very specific computational needs. In datacenters, offload engines are increasingly being deployed to speed AI/ML applications. Cloud computing has naturally enabled aggregation of large datasets. The adoption of AI and ML techniques to speed analyses of data or to look of novel applications of existing data continues to accelerate.

SiTime network synchronizer products, along with precision TCXOs and OCXOs, are key technology enablers for precise timekeeping in datacenters that deploy AI/ML offload engines.

### Block Diagram



AI/ML workloads can be efficiently handled with specialized hardware such as compute platforms based on graphics processing chips from Nvidia (as an example). Another trend in datacenters is the adoption of distributed computing. Large workloads are distributed across HW racks that have multiple general-purpose CPUs (from Intel or ARM) and local memory. Precise timekeeping is therefore critical in scheduling the workloads and maintaining correctness and coherency of the datasets. AI/ML offload engines are expensive resources and ensuring high utilization of these offload engines is a key system design goal.

Featured products – please refer to [SiTime.com](https://www.sitime.com) or [contact us](#) for more options.

Type	Product	Frequency	Key Features	Key Values
Network Synchronizer	<a href="#">SiT95148</a>	1 to 220 MHz	<ul style="list-style-type: none"> <li>• 4 inputs, 11 outputs</li> <li>• Up to 2 GHz clock output frequencies</li> <li>• 120 fs<sup>1</sup> integrated phase jitter</li> <li>• Programmable PLL loop bandwidth, 1mHz to 4KHz</li> <li>• Digital frequency control</li> <li>• -40°C to 85°C</li> <li>• 9.0 x 9.0 mm package</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple clock domains, multiple clock outputs enables complex clock architectures</li> <li>• 10x more resistant to vibration and board bending</li> </ul>
Super-TCXO	<a href="#">SiT5501</a> <sup>2</sup>	1 to 60 MHz	<ul style="list-style-type: none"> <li>• ±10 ppb stability</li> <li>• ±0.5 ppb/°C</li> <li>• 2E-11 ADEV</li> <li>• -40°C to 105°C</li> <li>• 7.0 x 5.0 mm package</li> </ul>	<ul style="list-style-type: none"> <li>• Ensures QoS requirements are met in Telecom Equipment in hostile environments</li> </ul>

<sup>1</sup> 12 kHz to 20 MHz integration range    <sup>2</sup> Please [contact SiTime](#) for higher frequencies.



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