SILICON IP

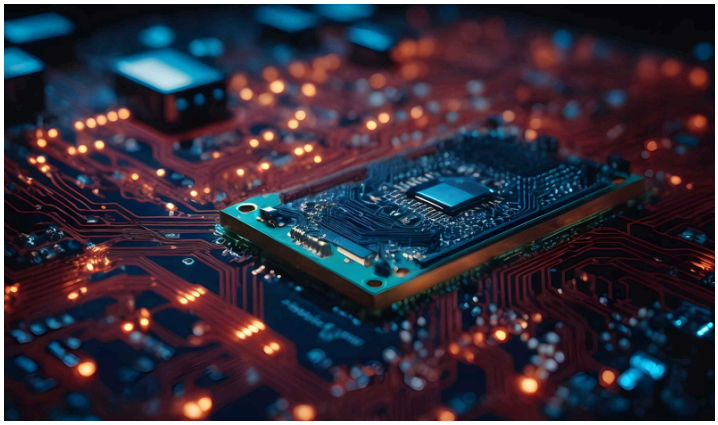
PROCESSOR PERIPHERALS: SCATTER-GATHER DMA ENGINE

High-performance processor peripheral that facilitates efficient, flexible data transfers between memory and devices, minimizing CPU involvement and enhancing system throughput.

For sales, please contact info@xtremesilica.com

OVERVIEW

The Scatter-Gather DMA (Direct Memory Access) Engine is a specialized peripheral that efficiently manages data transfers between memory and peripheral devices without CPU involvement for each transaction. Unlike traditional DMA, which transfers data in continuous blocks, scatter-gather DMA offers flexible data movement by gathering data from non-contiguous memory locations and scattering it to various peripheral destinations in a single transaction. This reduces CPU overhead and enhances system performance, making it ideal for applications requiring high data throughput, such as multimedia processing, networking, and real-time data acquisition. It's essential for optimizing performance in systems with fragmented memory spaces and complex architectures.



KEY FEATURES

Non-Contiguous Data Handling

- It can transfer data from multiple, non-contiguous memory locations (scatter) and direct it to multiple peripheral or memory destinations (gather) without CPU intervention.

Reduced CPU Overhead

- By offloading data transfer tasks, the CPU is freed from managing individual transactions, allowing it to focus on other processes and improving overall system efficiency.

Transfer Chaining

- The engine can link multiple transfer descriptors together, allowing continuous and automatic data transfer sequences, which is ideal for high-bandwidth and real-time applications.

Programmable Control

- It offers the flexibility to configure the source and destination addresses, transfer size, and data format, giving developers control over complex data flow patterns.

High Throughput

- With its ability to manage multiple data streams simultaneously, the scatter-gather DMA engine ensures efficient data handling, especially in bandwidth-intensive applications like video streaming and networking.

Interrupt Support

- It can generate interrupts after the completion of specific transfers, enabling precise synchronization and coordination with other system components.

Error Detection

- Many scatter-gather DMA engines include built-in mechanisms for error checking, such as data integrity verification, ensuring reliable data transfers.

Low Power Consumption

- Since it minimizes CPU intervention, the DMA engine contributes to energy efficiency, which is crucial in embedded systems and mobile devices.

100G UDP OFFLOAD ENGINE APPLICATIONS

Multimedia Processing

- In audio, video, and image processing applications, large amounts of data need to be moved quickly and efficiently. Scatter-gather DMA helps stream data from non-contiguous memory segments to processing units like codecs and media processors without CPU intervention, improving overall performance.

Networking

- In network routers, switches, and interfaces, scatter-gather DMA is used to manage the flow of packets from fragmented buffers to the network interfaces. This is essential for maintaining high-speed data transmission and reducing latency in high-performance networking environments.

Storage Systems

- In modern storage devices, such as SSDs, the engine allows efficient handling of file systems where data may not be stored contiguously. Scatter-gather DMA accelerates data read/write operations, ensuring faster access and response times.

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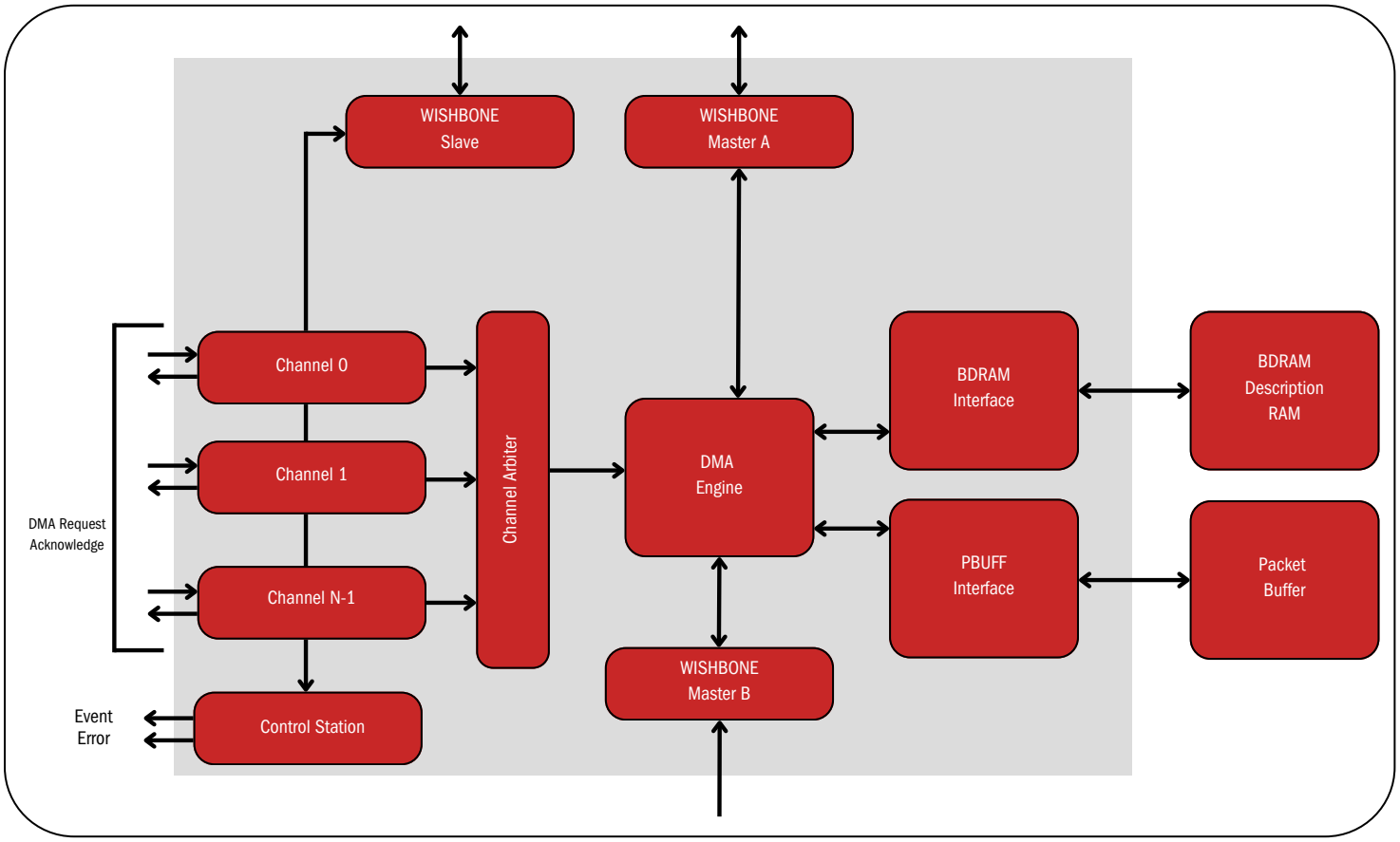
Network Function Virtualization (NFV)

- By offloading network processing tasks, the engine improves the performance of virtualized network functions, enabling faster deployment and scalability of network services.

Content Delivery Networks (CDNs)

- The offload engine enhances the delivery of content across distributed networks by optimizing UDP traffic, which is essential for fast and efficient content distribution to end-users.

SCATTER GATHER DMA ENGINE ARCHITECTURE



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XtremeSilica Technologies Private Limited
494, 2nd Floor, CMH Road, Indiranagar,
Bengaluru, Karnataka 560038 India
www.xtremesilica.com
info@xtremesilica.com
+91 79932 79934