

# FlexNoC<sup>®</sup> 5 XL Option

## Overview

FlexNoC 5 XL Option from Arteris is a game-changer for developing small to large-scale topologies, particularly in next-generation deep neural network (DNN) and machine learning systems. This powerful option takes the capabilities of FlexNoC 5 to new heights, offering advanced features and optimizations for accelerated development and optimized network implementation.

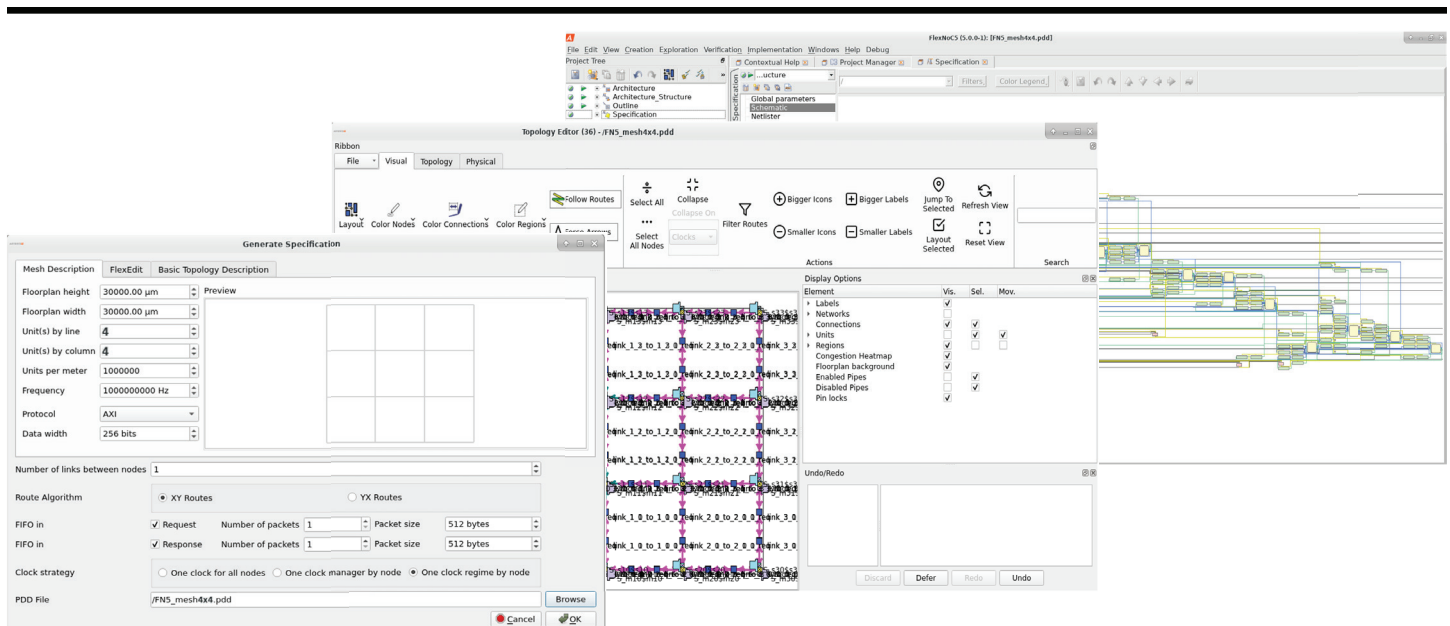
With the XL Option, designers can effortlessly automate and streamline the creation of complex topologies, including those required by advanced DNN and machine learning systems. The option facilitates the generation of mesh-based interconnects, enabling enhanced scalability and flexibility to meet the demanding needs of these cutting-edge applications.

In addition to supporting mesh generation, the XL Option also expands the number of NoC initiators and targets, allowing for the integration of a more significant number of IP blocks and components within the system. This opens up opportunities for more intricate and sophisticated designs, ensuring seamless integration of diverse functionalities.

Furthermore, the XL Option introduces the capability of utilizing broadcast links and virtual channels, enhancing communication efficiency and optimizing data flow in complex

## Highlights

- Mesh-based interconnect generation for enhanced scalability and flexibility.
- Expanded number of NoC initiators and targets for seamless integration of IP blocks.
- Improved network performance and scalability for evolving requirements.
- Enhanced data flow optimization and reduced latency for data-intensive applications.
- Enables efficient handling of large data sets and complex algorithms.
- Empowers designers to stay at the forefront of innovation in DNN and machine learning applications.



network architectures. This feature enables efficient multicast, reducing the complexity and overhead associated with point-to-point communication schemes.

To accommodate the increasing data requirements of modern systems, the XL Option offers expanded data widths of up to 1024 bits. This increased bandwidth empowers designers to handle higher data volumes and optimize system performance, particularly in data-intensive applications like DNN and machine learning.

## Benefits

### Advanced scalability and flexibility.

The XL Option introduces mesh-based interconnect generation, enabling superior scalability and flexibility. Designers can effortlessly create complex topologies, particularly for next-generation DNN and machine learning systems. This capability empowers them to handle the increasing demands of these advanced applications and adapt the interconnect structure to meet specific requirements.

### Seamless integration of IP blocks and components.

With an expanded number of NoC initiators and targets, the XL Option facilitates the integration of a larger number of IP blocks and components within the system. This capability enables designers to create intricate and sophisticated designs without compromising on system performance. The seamless integration ensures efficient communication and collaboration among various components, leading to optimized system functionality.

### Enhanced communication efficiency.

The XL Option introduces the utilization of broadcast links and virtual channels, enhancing communication efficiency in complex network architectures. This feature allows for efficient multicast, reducing the complexity and overhead associated with point-to-point communication schemes. By optimizing data flow and minimizing congestion, the XL Option improves overall system performance and ensures smooth operation even in highly interconnected designs.

### Increased data widths for higher data volumes.

The XL Option offers expanded data widths of up to 1024 bits, providing increased bandwidth for handling higher data volumes. This capability is particularly beneficial in data-intensive applications such as DNN and machine learning systems. The increased data width empowers designers to efficiently process and transfer large amounts of data, improving system performance and accelerating data-intensive computations.

### Accelerated development of next-generation systems.

By incorporating advanced capabilities and optimizations, the XL Option accelerates the development of next-generation systems. Designers can efficiently implement complex topologies, optimize network performance, and improve scalability. The XL Option acts as a catalyst for the creation of advanced DNN and machine learning systems, allowing designers to meet the industry's ever-growing demands in a time-efficient and cost-effective manner.

### High Bandwidth Memory (HBM) and multichannel memory support.

The XL Option also includes support for High Bandwidth Memory (HBM) and multichannel memory. HBM enables efficient data access and improved memory performance, essential for data-

intensive applications with high memory bandwidth requirements. Multichannel memory support allows for parallel data transfer, increasing memory bandwidth and enhancing overall system performance. These memory enhancements further optimize the XL Option for handling large-scale data processing and memory-intensive workloads.

The types of HBM and multichannel memory supported ultimately depend on the datawidth of the configured NoC, and the number of channels required. All NoC interfacing is done over AXI to the respective memory controller. Examples of HBM memory would be HBM2E/HBM2 and HBM3. With an interface with 16 independent channels, HBM3 can achieve 820 GB/s of bandwidth for modern SoC designs.

## Features

### Mesh-based interconnect generation.

By offering mesh-based interconnect generation, the XL Option addresses the customer's need for scalability and flexibility. It allows for the creation of complex topologies required by advanced systems, such as deep neural networks and machine learning. This feature enables the seamless expansion of the network, accommodating the increasing demands of these cutting-edge applications.

### Expanded number of NoC initiators and targets.

The increased number of NoC initiators and targets fulfills the customer's need to seamlessly integrate a larger number of IP blocks and components within the system. It provides the necessary capacity to incorporate diverse functionalities and enables the design of more intricate and sophisticated systems. This feature empowers customers to build complex SoCs without compromising on integration capabilities.

### Broadcast links, virtual channels, and source-synchronous communications.

The XL Option addresses the customer's need for efficient and synchronized data communication within the system. By supporting broadcast links, virtual channels, and source-synchronous communications, it enables the optimized transfer of data across the network. This feature ensures that data can be efficiently multicast to multiple destinations, reducing the complexity and overhead of individual point-to-point communications. It also enables the synchronization of data transfers, minimizing the potential for data corruption or timing issues. This capability enhances the overall system performance and reliability, meeting the customer's requirements for high-speed and synchronized communication within their designs.

### 1024 bit data widths.

The XL Option addresses the customer's need to handle higher data volumes and optimize system performance. With support for increased data widths of up to 1024 bits, it enables processing more significant chunks of data in parallel. This feature is particularly beneficial for data-intensive applications like deep neural networks and machine learning, where high-bandwidth data transfer is crucial for efficient processing and analysis.

### High Bandwidth Memory (HBM) support.

Including HBM support in the XL Option caters to the customer's need for efficient data access and improved memory performance. HBM enables faster data transfer between the memory and the processing units, reducing memory latency and improving overall

system responsiveness. This feature enhances the performance of memory-intensive applications, ensuring smooth operation and optimized data handling. Examples of HBM memory would be HBM2E/HBM2 and HBM3.

#### **Multichannel memory support.**

By providing multichannel memory support, the XL Option meets the customer's need for parallel data transfer and increased memory bandwidth. This feature allows for simultaneous data transfer through multiple memory channels, effectively boosting the memory throughput. It enhances the system's ability to handle large amounts of data, leading to improved performance in memory-bound applications and efficient utilization of available memory resources.

### **Complementary Products**

FlexWay is a cost-efficient entry-level NoC product with an optimized feature subset of FlexNoC for smaller-scale SoC designs. Note that the XL Option is only available to FlexNoC 5.x.

Both FlexNoC and FlexWay products can export IP-XACT files that can then be used in the Arteris Magillem import/export for enhanced productivity.

### **About Arteris**

Arteris is a leading provider of system IP for the acceleration of system-on-chip (SoC) development across today's electronic systems. Arteris network-on-chip (NoC) interconnect IP and SoC integration technology enable higher product performance with lower power consumption and faster time to market, delivering better SoC economics so its customers can focus on dreaming up what comes next. [Learn more at arteris.com](https://www.arteris.com).



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