

Introducing 128G Fibre Channel for Storage Networking

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The technology landscape is continuously evolving with ever-growing demands for faster data access, storage, and transmission. One of the latest advancements in this domain is the introduction of the 128GFC (128 Gigabit Fibre Channel), often called Gen 8. Fibre Channel has long been the go-to protocol for mission-critical, high-performance storage networks, primarily in data centers. This new iteration promises to significantly boost data throughput, reduce latency, and provide greater scalability.

INCITS FC-PI-8: The 128G Fibre Channel Standard: An Overview

FC-PI-8, which stands for Fibre Channel Physical Interface 8, is the latest iteration in the Fibre Channel physical interface standards. It doubles the data rate of the previous 64GFC standard to 128 gigabits per second. This enhancement is crucial as data demands continue to escalate across industries, driven by trends like big data analytics, data warehousing, and virtualization.

FC-PI-8 introduces several key features, including:

- **Increased Data Rate:** The 128GFC standard significantly boosts throughput, allowing for faster data transfers and improved performance in storage networks.
- **Backward Compatibility:** FC-PI-8 128GFC ensures compatibility of up to two generations of previous Fibre Channel speeds and is cable- and connector-compatible, allowing organizations to transition smoothly without requiring a complete overhaul of existing infrastructure. 128GFC uses LC cable connectors and the SFP+ form factor and is capable of 100 meter cable lengths using OM4/5 cable plants.
- **Modulation for 128GFC:** 128GFC uses PAM4 modulation and is 112.2Gbps (56.1Gb)
- **Enhanced bit error rate:** (BER) of 1e-15
- **Forward Error Correction:** Mandatory for all 128GFC links

The development of FC-PI-8 kicked off in December 2022 and took place within the INCITS Fibre Channel technical committee, which is responsible for creating and maintaining Fibre Channel standards. The FC-PI-8 committee comprises industry experts from various sectors, including hardware manufacturers, software developers, and end users. This collaborative environment ensures that the standards developed are practical and address real-world needs. The standards development process encompassed:

- **Research and Requirements Gathering:** The process began with a thorough analysis of the industry needs. This work included assessing performance bottlenecks in existing Fibre Channel systems and forecasting future demands.
- **Drafting and Proposals:** After establishing requirements, the committee drafted initial proposals for FC-PI-8, outlining the technical specifications and objectives.
- **Testing and Validation:** Prototypes and implementations of the standard were rigorously tested to validate performance metrics, signal integrity, and compatibility with existing systems. Feedback from these tests was crucial in refining the standard.
- **Finalization and Approval:** After multiple rounds of review and revisions, the final standard was approved by INCITS. This included contributions from a diverse range of stakeholders, ensuring that FC-PI-8 meets the needs of a broad audience.

Benefits of 128GFC for Customers

Improved Data Throughput

One of the most significant advantages of 128GFC is the substantial increase in data throughput. Using 128GFC, customers can transfer much larger amounts of data in less time than with earlier Fibre Channel iterations. This improvement translates to faster backups, quicker data recovery, and a smoother flow of information between systems. Enterprises managing vast volumes of structured data, such as data warehousing, decision support systems, and financial services, will benefit immensely from the increased throughput.

Higher Scalability for Growing Data Needs

As data storage requirements grow exponentially, so does the need for infrastructure capable of scaling without compromising performance. The 128GFC standard allows organizations to scale up their SANs more easily, ensuring they can meet future data demands without overhauling their existing infrastructure. The new technology is backward-compatible with previous generations of Fibre Channel, making it easier for companies to upgrade at their own pace without immediate disruption.



Enhanced Reliability and Security

Fibre Channel technology is known for its reliability, and 128GFC continues this tradition. SANs powered by 128GFC are designed for maximum uptime and offer robust error-correction mechanisms, ensuring data integrity even during high-speed transmissions. This is critical for industries with zero tolerance for data loss or corruption, such as banking, government, and healthcare sectors. Moreover, Fibre Channel networks are inherently secure, operating in isolated storage networks that reduce the risks associated with open, internet-based protocols like Ethernet.

Cost-Effectiveness Through Improved Efficiency

While adopting newer standards often comes with a significant upfront investment, the long-term savings from the efficiency gains offered by 128GFC can be considerable. The increased speed and reliability reduce the need for duplicate infrastructure and allow companies to get more value from their existing systems. As data centers move toward energy efficiency, the streamlined processes that 128GFC enables can also reduce power consumption and cooling costs, further boosting cost-effectiveness.

Conclusion

The FC-P1-8 standard development for 128GFC was completed by the end of 2023 and signals the start of product development by Fibre Channel component suppliers. We expect to see 128GFC products in the marketplace by the end of 2025. The 128GFC standard marks a significant advancement in Fibre Channel technology, offering a suite of benefits tailored to the needs of modern enterprises. By improving throughput, reducing latency, enhancing reliability, and supporting future growth, 128GFC promises to transform the performance of mission-critical applications. For businesses that depend on fast, secure, and scalable data transmission, upgrading to 128GFC is not just an option but a crucial step in staying competitive in an increasingly data-driven world.