



SNIA DEVELOPER CONFERENCE



BY Developers FOR Developers

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Santa Clara, CA

FIBRE CHANNEL - ZERO TO 256GFC

An FCIA Presentation

Presented by

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Fibre Channel Industry Association - President Emeritus

2024 Fibre Channel Market Milestones



**\$50B+ FC
Revenue**

Total Revenue of Adapter
and Switch products



**35M+ FC Ports In
Service**

Adapter and switch ports
estimated in service

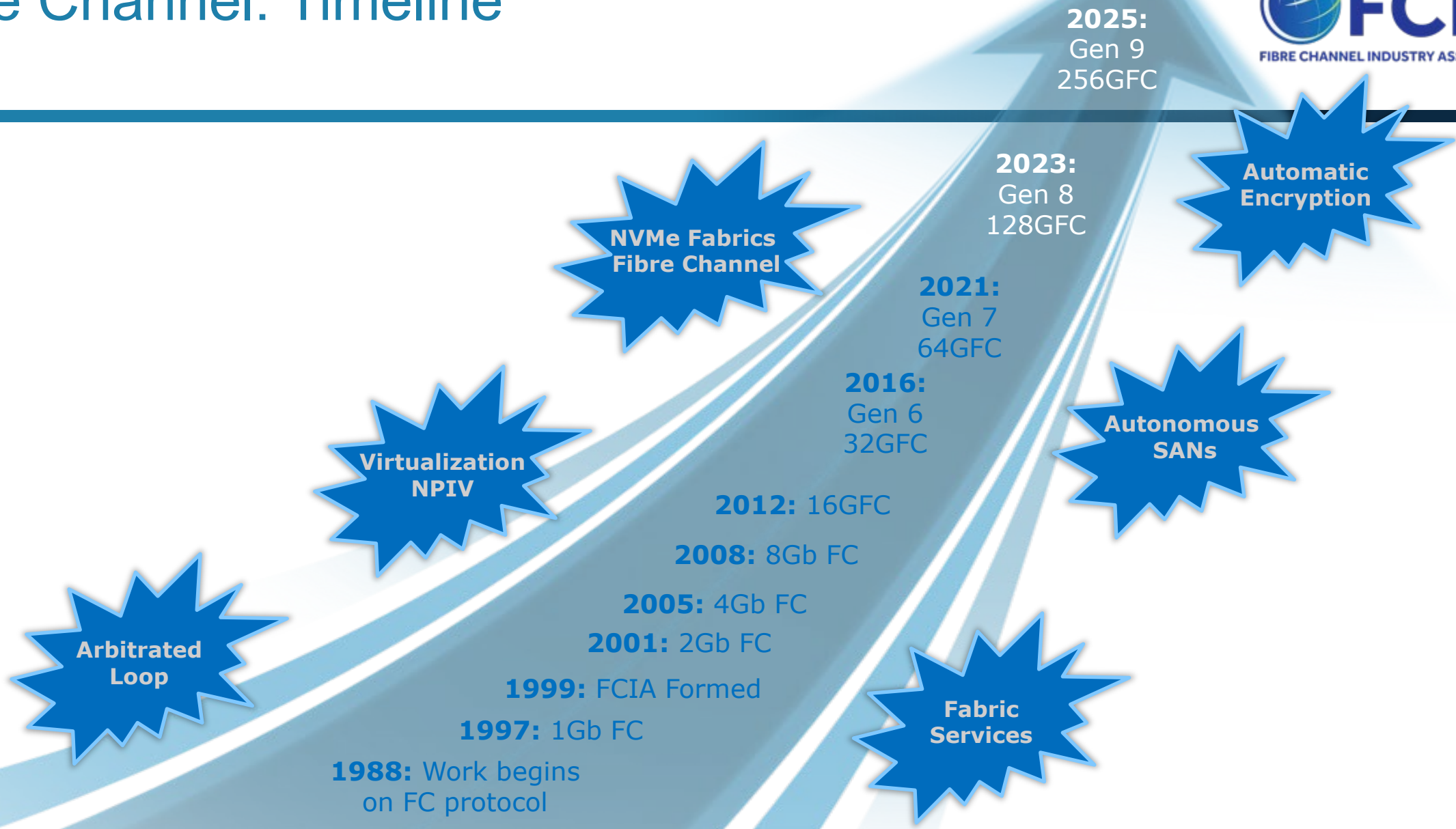


**160M+ FC Total
Ports Shipped**

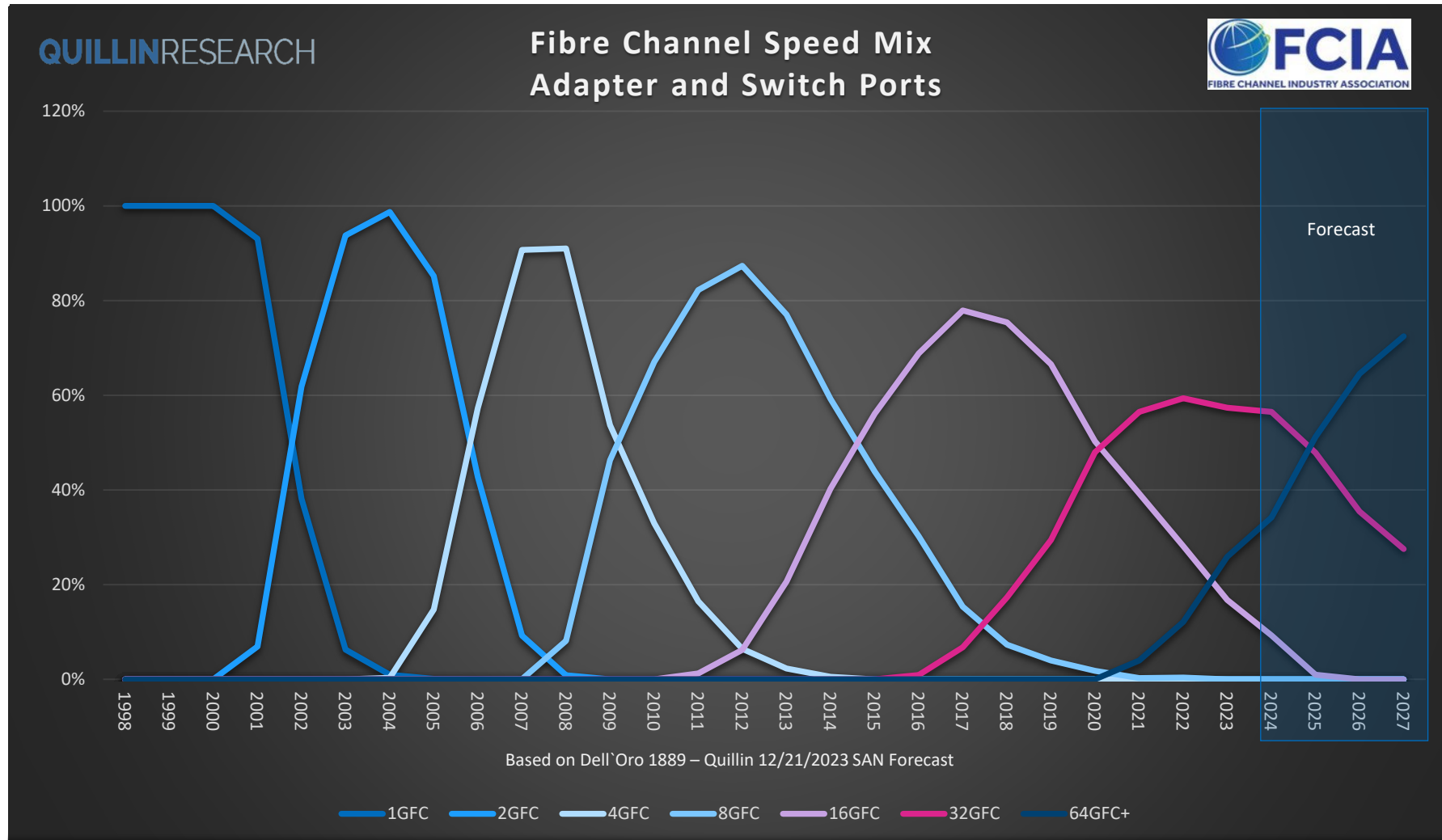
Adapter and switch ports

*Quillin Research 2023 SAN forecast – cumulative adapter and switch ports from 1998 through 2023

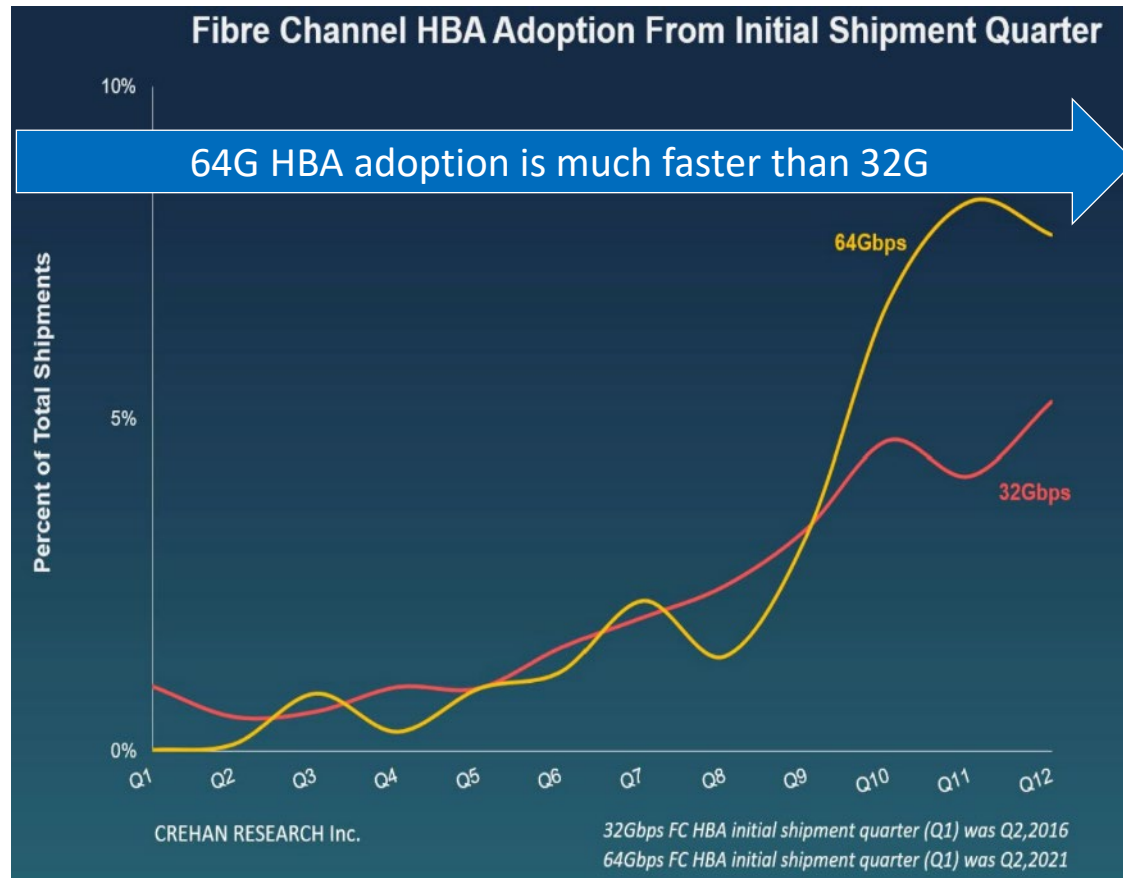
Fibre Channel: Timeline



Fibre Channel Port Growth History



64G Fibre Channel HBA Adoption is Accelerating



Source: Crehan Research, Quarterly Market Shares- FC HBAs, 2024

Source: Tolly Test Reports, [223133](#)

Source: [Crehan Research](#), 2024

Why?

- 1. Aggressive pricing with server OEMs:** Little to no markup of 64GFC HBA by some major server OEMs.
- 2. Higher application performance:** 32G-enabled storage arrays perform more than 1.7x faster when connected to 64GFC Server and Fabric Switches.
- 3. Broad 64GFC Adoption by switch vendors:** Early adoption of 64GFC capable switches have prepared datacenters for rapid 64G adoption.

Why Fibre Channel?

- **Designed for Enterprise Storage Networking**
 - Nearly all all-flash block storage arrays use FC
- **Security**
 - Not Ethernet, Hardened Zoning, Fabric Services
 - New FC-SP-3, Auto-Encryption Everywhere!
- **High Performance**
 - Low Latency, Low CPU utilization, High IOPs
 - Highest fabric utilization without packet retransmission
- **Reliable**
 - Lossless, credit based transmission
 - Highest BER (Bit Error Rate) network design
- **Investment Protection**
 - 2 Generation backward/forward compatibility by design.
 - Cable plug compatibility – cable length/loss standardization

WHATS NEW?

- INCITS FC-PI-8 started in Dec 2022
- Goal – Fastest single lane speed (until 256GFC)
- Double the bandwidth of 64GFC

HOW

- Two Generation Backward compatibility – Investment Protection
- Existing Cable assemblies – LC (Connector) SFP+ (Form Factor)
- 100 Meter multimode reach / 10KM single mode

WHEN

- Specification completion 2023
- Market availability – 2025 est.

WHATS NEW?

- Goal – Fastest single lane speed! – Not 200GbE
- Double the bandwidth of 128GFC
- Two Generation Backward compatibility – Investment Protection

HOW

- Existing Cable assemblies – LC (Connector) SFP+ and SFP DD (Form Factor)
- >100M Multimode (FC Exclusive) / Single Mode 10KM
- Data Rate: PAM4 224.4 Gbps (212.5 200GbE)

WHEN

- Tech Defined Dec 2025 – Publication Dec 2026
- Market availability – 2029 est.

- **Strong Industry-wide development support**
 - 2014 T11 began work on FC-NVMe
 - Industry milestones: Demos, Plugfests, first product shipments
 - 2020 FC-NVMe-2 complete, 2024 FC-NVMe-3 in progress
- **2024: FC - Leading Fully Supported NVMe-oF[™] Transport Solution**
 - FC-NVMe solutions shipping from all major FC component/array storage vendors
 - Support for all major operating systems
 - Significant application performance improvements over traditional SCSI
- **Future of NVMe/FC**
 - Continued performance improvements as OS's refine NVMe-oF transport
 - Broadened vendor and OS adoption

WHATS NEW?

- Updated Standards for Fibre Channel Security
- Stay Ahead of government security guidelines for 2025-2030
- Eliminate outdated security algorithms
- Clarification of implementation profiles

HOW

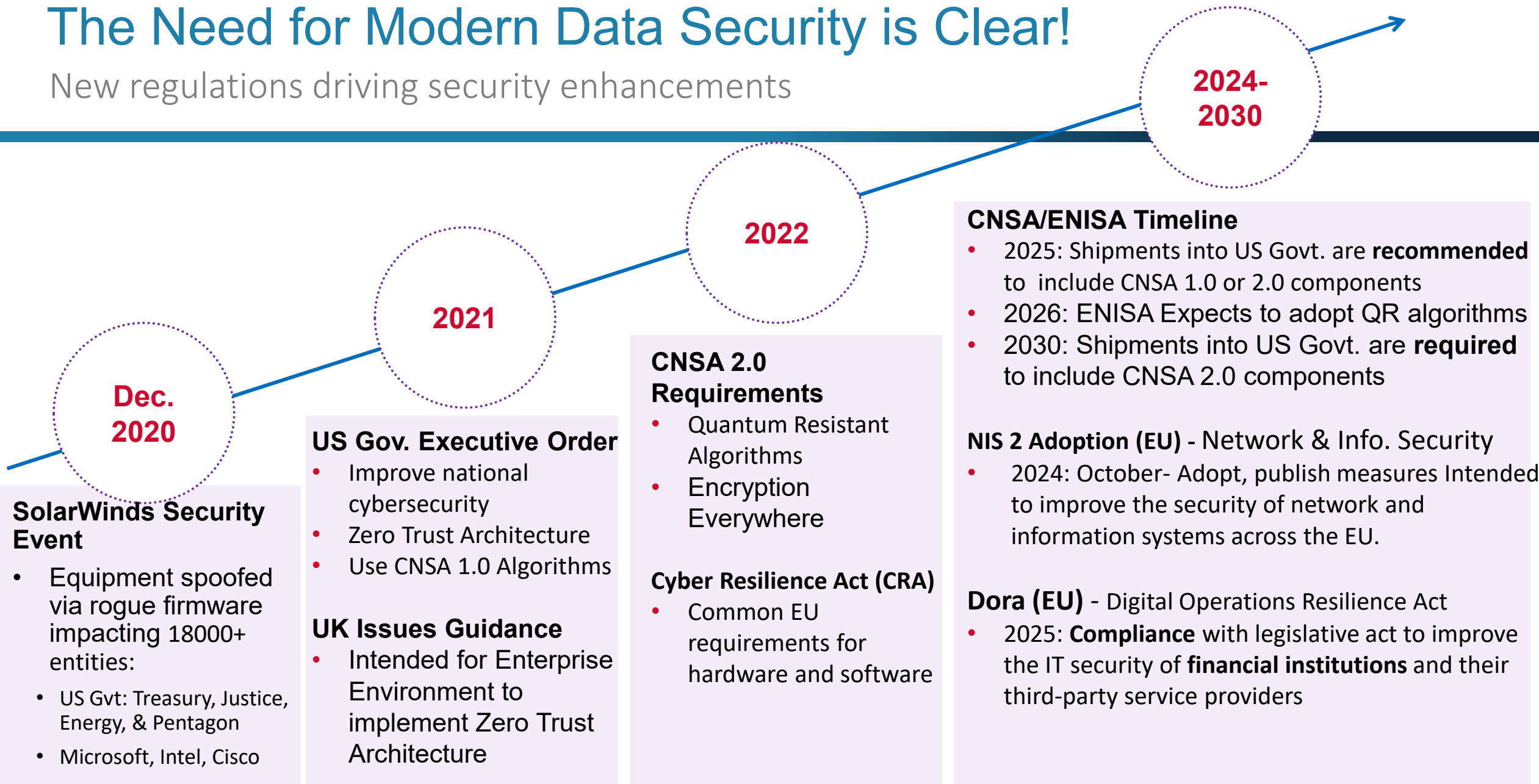
- Add definitions for CNSA 1 and 2 Algorithms
- Removed MD5, SHA1 and others
- Automatic in-flight FC encryption profile

WHEN

- Technical Definitions Underway
- Technical definition by Dec 2024, Est standard completion by 2025
- Products pervasive in marketplace in 2025

The Need for Modern Data Security is Clear!

New regulations driving security enhancements



Fibre Channel In-Flight Encryption Standardized & Simplified

Easy as 1-2-3...

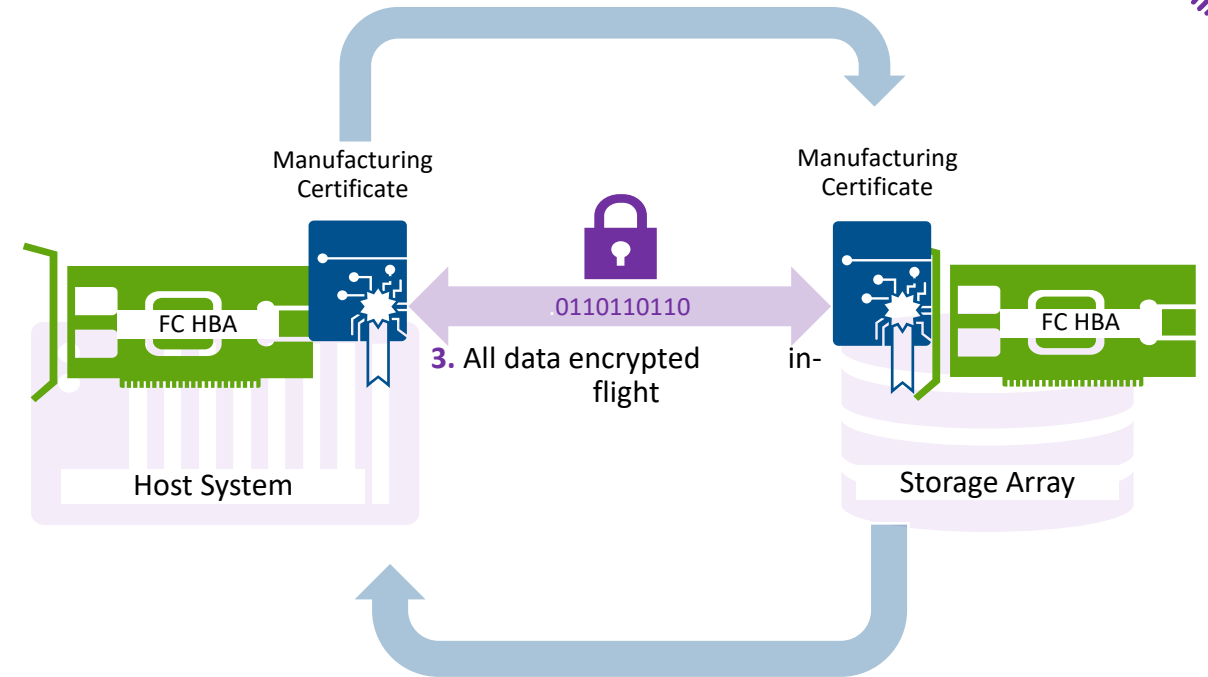
1. WWPN Authentication
2. Random session keys
3. Fully encrypted data in flight
4. Covers all Traffic Types (SCSI, NVME, FICON)
5. Interoperable

Secure Fibre Channel HBA for In-Flight encryption

- Standard product offering
- Automatic
 - No external HW, Agents, or Admin configuration
- Simple key management
- High performance
- Preserves storage efficiency: dedupe and compression
- Preserves FC Discovery Paradigms
- Preserves FC Management Paradigms
- Allows other security options concurrently

Session-based Encryption

1. Authenticate with manufacturing certificates
2. Negotiate random session keys



1. Authenticate with manufacturing certificates
2. Negotiate random session keys

Industry Standardization:
INCITS FC-SP-3 Completion in 2025

The Need for Fibre Channel Education

- **Changes in IT Education Trends:**

- Fewer specialists – more generalists
- Survey results*: 62% of new IT positions are being filled by generalists
- Seasoned FC storage/SAN specialists are entering retirement age

- **FCIA Education Initiative**

- Bi-monthly BrightTALK Expert webinars:
<https://www.brighttalk.com/channel/14967/>
- FCIA YouTube Channel:
<https://www.youtube.com/channel/UCeSb0O94Ot-RfZSDg2ykRBA>
- YouTube Playlists: Basics, Fibre Channel Expert Courses, FC-NVMe
- www.Fibrechannel.org/fcia-blog

[*ESG storage trend survey 62% of new IT positions are being filled by generalists](#)

How to Participate with the FCIA

- <https://fibrenchannel.org>
 - FC Solutions Guide
 - FC Roadmaps
 - Plugfest Information
 - FC Education links
- **FC Education**
 - Library of on-demand webcasts
 - Available at FCIA BrightTALK channel
<https://www.brighttalk.com/channel/14967>
- **Social Media**
 - LinkedIn, Twitter @FCIAnews

Q&A



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