QSAN Official Document

XMirror

White Paper

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ANNOUNCEMENT

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PREFACE

Technical Support

Do you have any questions or need help trouble-shooting a problem? Please contact QSAN Support, we will reply to you as soon as possible.

- Via the Web: https://www.qsan.com/technical_support
- Via Telephone: +886-2-77206355
- (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Teams / Skype ID: qsan.support
- (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: support@qsan.com

Information, Tip, and Caution

This document uses the following symbols to draw attention to important safety and operational information.



INFORMATION

INFORMATION provides useful knowledge, definition, or terminology for reference.



TIP

TIP provides helpful suggestions for performing tasks more effectively.

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CAUTION

CAUTION indicates that failure to take a specified action could result in damage to the system.

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1. INTRODUCTION

In response to the increasing demand for diverse backup solutions, QSAN has developed XMirror, a unique file-level synchronization and backup technology. While traditional snapshot replication and Rsync provide foundational protection, XMirror is designed specifically for the XN series platforms to offer more convenient, real-time data consistency and enhanced security during transfers.

XMirror utilizes a decentralized, P2P (Peer-to-Peer) architecture, allowing enterprises to synchronize data across up to 8 nodes within a single group, known as a "Zone". This eliminates single points of failure and ensures that even if one node goes offline, the rest of the Zone remains operational.

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2. THEORY OF OPERATION

QSAN XMirror is a file-level synchronization and backup solution designed for NAS-to-NAS environments. It enables seamless data consistency across multiple sites while providing:

- Real-time or near real-time synchronization
- Decentralized P2P architecture
- Flexible one-way and two-way synchronization modes
- Built-in version control and rollback capability

By eliminating dependency on a central controller, XMirror enhances availability, scalability, and operational resilience.

2.1. System Architecture and Compatibility

2.1.1. Synchronization Zone Architecture

XMirror's core concept is synchronization zones:

- A zone can contain up to 8 device folders (nodes)
- All nodes maintain consistent data within the zone
- Each node operates as an equal peer in a decentralized model

This design ensures no single point of failure and provides high scalability and deployment flexibility.

2.1.2. Synchronization Modes

XMirror offers three different synchronization modes to suit various business workflows:

- **Mirror Sync (Two-way):** Changes on either end are immediately synchronized to the other. This is ideal for cross-site collaboration, where teams in different locations work on the same dataset.

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- **Mirror Push (One-way):** The source node proactively pushes all changes to the target node. Best suited for data distribution or primary backup tasks.
- **Mirror Pull (One-way):** The target node proactively requests data from the source node. This is suitable for centralized backup centers that need to collect data from multiple branches.

2.1.3. File-Level Synchronization Mechanism

XMirror operates at file level, which means:

- Only modified files are transferred
- Bandwidth usage is minimized
- Synchronization efficiency is improved

Furthermore, synchronization is triggered when data is in an idle state and continuous file access or modification may delay synchronization.

2.1.4. Version Control and Rollback

XMirror's built-in version control features:

- A new version is created with each sync
- Supports up to 128 versions
- Supports rollback to previous versions

In addition, full rollback functionality is supported in two-way sync mode, with versions stored in a hidden directory (e.g., .xmversions/).

2.1.5. Conflict Resolution

In a two-way synchronized scenario, if editing operations occur simultaneously:

- The local version takes precedence.
- The conflicting remote file is renamed and a timestamp is added.

This mechanism prevents data overwriting and preserves both versions.

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2.2. Constraints

To ensure system stability and performance, the following constraints and requirements apply:

- **Platform Compatibility:** XMirror is optimized for XN series running QSM 4.2.0 or later. It is not supported on pure block-level devices like the XF series.
- **Naming Conventions:** Zone names must consist only of letters, numbers, dots, underscores, and hyphens, and cannot exceed 64 characters. Consecutive dots or dots at the beginning/end of a name are prohibited.
- **Network Behavior:** Current versions do not support binding to a specific LAN port; the system selects an interface based on the system routing table. IT managers are encouraged to use VLANs to optimize traffic.
- **Version Rollback Logic:** In one-way sync modes, version rollback is primarily applicable to remote folders to restore data deleted by the master node.
- **Expansion Limits:** There is a functional limit of 4 JBOFs for the Head unit, and JBOF connectivity requires non-management ports with speeds of at least 10 Gb/s.

2.3. Comparison of Data Protection

To help IT administrators choose the most suitable data protection tool, the table below compares the core features available in the QSAN ecosystem.

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Table 2-1 Comparison of Data Protection Features

FEATURE	LEVEL	TRIGGER MODE	CORE VALUE	TYPICAL USE CASE
XMirror	File	Real-time	Multi-site Sync	NAS-to-NAS folder synchronization and collaboration
Cloud Sync	File	Real-time / Schedule	Hybrid Cloud Collaboration	Sync local files with public cloud platforms
Cloud Backup	File	Schedule	Disaster Archiving	Long-term archiving to S3 / Azure
QReplica	Block	Schedule	Disaster Recovery	DR for LUNs and Database systems
Snapshot	Block	Schedule / Manual	Point-in-time Recovery	Ransomware protection and file rescue
QSeal	File	On demand	Integrity Protection	Tamper-proof records for legal or medical use

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3. CONFIGURE

This chapter will discuss how to use XMirror.

3.1. Support Firmware Version

The following summarizes the firmware versions.

Firmware Version

- QSM
  - Firmware version 4.2.0 and later
- XInsight
  - Version 1.6.0 and later

3.2. Install XInsight

XInsight is a centralized IT infrastructure management tool for managing QSAN products. XMirror is a built-in feature. Please visit the QSAN website https://www.qsan.com/solution/xinsight to download and install it.

3.3. Operate XMirror

For instructions on how to use XMirror, please refer to the XMirror Setup Guide.

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4. CONCLUSION

QSAN XMirror provides a robust and flexible solution for enterprises requiring high-availability file synchronization and disaster recovery. By integrating decentralized P2P technology with sophisticated versioning and TLS encryption, XMirror bridges the gap between traditional backup methods and modern collaborative needs. Whether utilized for one-way disaster archiving or two-way real-time team collaboration, XMirror ensures data integrity and operational efficiency across the QSM ecosystem.

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5. APPENDIX

5.1. Apply To

- QSM firmware 4.2.0 and later
- XInsight 1.6.0 and later

5.2. Reference

Product Page

- XN5 Series
- XN4 Series
- XN3 Series
- XN2 Series
- XN1 Series

Management Tool

- XInsight

Document

- QSM 4 Software Manual

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