Introduction

Resilio Connect is a distributed file delivery and synchronization solution capable of moving large amounts of data to many locations. The performance excels when that data needs to be moved across unreliable or high latency networks. Built on the same distributed protocol powering Resilio Sync, Connect is designed to empower high-performance file transfer applications, scaling to thousands of nodes, TBs of data, and millions of individual files.

The decentralized architecture of Resilio Connect provides substantial benefits over existing centralized tools that have a single point of failure or require clustering for performance. Using our unique Micro Transport Protocol (µTP2), Resilio Connect offers WAN-optimized transfers and can reach effective speed of multiple Gbit/s over WAN or LAN. On top of the decentralized system is a browser-based management console that offers the ability to schedule and automate transfers, script pre and post file transfer actions, configure network usage, review logs, and more.

Use Cases

1-to-Many File Replication

In today's environment there is an increasing expectation that data will quickly be accessible, regardless of the number of endpoints, the size of the data, or the reliability of the network (the peer-to-peer engine that powers Resilio Connect makes it uniquely suited to any 1-to-many replication use.) Software updates can be pushed to 1000s of retail locations, blueprints can be sent to 100s of firetrucks, or a new VM image could be sent to many dozens of servers.

Resilio Connect's distributed architecture leverages the combined power of all endpoints to deliver a solution that is faster and more reliable than anything else in the market. Utilizing local copies on the LAN instead of pulling them repeatedly from a distant and overloaded central server, Resilio avoids placing undue strain on weak links in the network, such as those connecting many remote offices or retail locations.



Free from the scaling limits and frequent failures of a centralized point of distribution, it's like having the performance of a local data center in every remote location, without the cost or administrative overhead. This software solution organically scales itself to the demands of any job without requiring your budget to invest in more centralized infrastructure. For this reason, Resilio Connect is the most efficient technology on the market for moving big data to many endpoints.

Applications

- Software Updates and Patching: Update every endpoint in seconds, when every second counts
- Software Development: Simultaneously deliver new builds to 100s of test machines in multiple locations
- Stop Sneakernet: Don't use Fedex to ship USB sticks to remote locations, Resilio reliably works on any network
- Get Big Data to Your Team: Collaborate on large data sets, even when your team is in the field
- Media Distribution: Get big media files to many locations, from thousands of theaters to as many remote destinations
- Education: Get the materials to every student, no matter how remote

Synchronizing Multiple Locations

With Resilio Connect, the speed increases as more endpoints are added. Resilio Connect will be 50% faster than one-to-one solutions in a 1:2 transfer scenario and 500% faster in a 1:10 scenario. In addition, Resilio Connect offers WAN-optimized transfers and consistently exceeds the performance of traditional one-to-one WAN optimization solutions. As an easy to deploy, cross-platform software solution, Resilio Connect delivers maximum flexibility as your customer and partnerships needs change.



Synchronizing Multiple Locations

Applications

- Tech: Update servers in multiple locations
- Media Post Processing: Move raw media files over long distances to remote post processing locations
- Medical Imagery: Securely and privately move medical imagery to experts anywhere in the world
- Media Ingest: Get media into the cloud for delivery or encoding for all of your customers
- CDN & Data Center Node Replication: Replicate big data to a few richly connected nodes fast
- Design and Marketing Agencies: Move the biggest raw media files to and from all of your Agents with a simple to deploy software solution

Overcoming Poor Connectivity

The peer-to-peer mesh network automatically serves any piece of a file from any client that has it. This leverages every single Resilio Connect client in your network, reducing the load on your servers and weak links in the network, while improving the availability to your data and infrastructure.

Resilio Connect takes the best of BitTorrent peer-to-peer networking experience to build a resilient transfer protocol designed to overcome network failures, and efficiently resume failed transfers.



Applications

- Retail: Avoid overloading limited connections to every store pulling the same update down again and again. Resilio is easy on the weak links and reliably gets the job done without resorting to usb sticks, field technicians, etc..
- IoT: Resilio scales in ways no centralized solution can. IoT demands a new way of thinking. A resilient and distributed solution from Resilio is the only viable future for IoT messaging and software updates to avoid costly and embarrassing security vulnerabilities that otherwise expose your customers waiting on the device update cycle
- Vehicles: Get data to and from 1000's of vehicles when they come in network range
- Industrial Sensors: Resilio can operate with intermittent network connectivity, making it perfect for industrial applications where the Internet isn't always available
- Body & Dash cams: There is no better solution to offload big video assets from thousands of cameras once they roll into wifi range at the base of operations. If a camera is called to duty before an offload is complete, Resilio will pick up right where it left off on return

Backup and Data Consolidation

Protect and save all of your data by using Resilio as your backup solution for your devices and servers. Everything that is backed up from your devices will be archived and stored to your designated backup location(s). Whether you're backing up a small number of large files or millions of smaller files, Resilio's powerful technology can transfer and consolidate any backup load from unlimited endpoints. The speed of recovery is unparalleled and instantaneous that can get any environment up and running again with the most up-to-date data.

Using Connect, people have the power to schedule all of their backups in addition to its continuous backup feature. We believe that you should have direct access to all your data – no matter how old it is.



AWS Instance

Applications

- Security Cameras: Review raw footage from security cameras scattered across various locations
- Servers & Computer Backup: Restore individual files, system, application data, etc. from one or many selected servers and computer
- Field Devices: Access and save data from remote users instantly and store in one central location
- Company Devices: Save the data and settings from unlimited users

Mobile Backup

With Resilio Connect, now people can experience the joys of backing up anything from their mobile device with reliability and, most importantly, security. Mobile devices simply become a part of the network you create within your infrastructure.

Additionally, with Resilio being compatible across the most popular device platforms, needing a unified, proprietary solution among your devices is completely negated. With WAN optimized transfers that also consistently outpace other solutions, Resilio combines the joys of reliability and security with speed of delivery.

Applications

- Quick Updates for Colleagues: In terms of insurance and government agencies, claims can be updated to files on the spot. Judgments can be made sooner, streamlining processes for security and sensitivity purposes thanks to Resilio's 100% reliability and rapid upload speeds
- Creative Design and Marketing Agencies: Work with your Agents remotely with a network that is point-to-point. Sync has become the most popular P2P syncing and file sharing application available for the most popular operating systems, meaning you don't even need to run on same devices as Agents. Great for Mac to Windows transferring and backup

Key Features

Performance

- The distributed protocol allows each client to act as a file server for others, allowing shared access to files without a central server. This reduces costs, saves time and bandwidth and improves reliability
- Agents don't need a whole file to participate in transmission: a single 32K block is sufficient
- The unique Micro Transport Protocol (µTP2) overcomes the bottlenecks of conventional synchronization tools (e.g. rsync, robocopy). Conventional tools default to large block-sizes which results in inefficient data transfer. Resilio Connect and µTP2 scale for maximum replication speed
- Sophisticated file level deduplication minimizes data transfer by not downloading files if they already exists in another folder

Reliability

- Data continues to be transferred and synchronized even if parts of the network are down or the central management console is unavailable.
- Does not depend on Internet access
- No single point of failure

Security

- Central control of all data flow.
- Files move directly between Agents no data lives in the cloud
- Resilio Connect is an on premise solution data stays only on your devices
- Cryptographic security no passwords to be compromised, no procedural security that could be bypassed
- Data in transit is always encrypted using SSL and AES 128-bit
- Forward secrecy is achieved using SRP
- No VPN required
- Replicates file and folder permissions on Linux (Windows coming soon)

Central Management

- · Central management console allows for complete control of all Resilio Connect instances in the environment
- Dashboard monitors the deployments and status of Agents and devices
- Setup individual or group policy based synchronizations
- Scheduler allows moving data at times of low load
- Headless Agents

Automation

- Resilio Connect is optimized and scalable to thousands of Agents, 1M+ files, and multi Gbit/s over WAN and LAN
- Smart logic behind the peer to peer network eliminates the need to configure every link
- The distributed architecture can scale without capex investment in additional hardware or network capacity
- All algorithms and code were reviewed by a 3rd party security auditor

P Resilio Conn	Top records (last 90 days) 은C ^て Max. speed: 829.3 Mbps ・ Total data transferred: 45.4 GB					
Jobs / Create new job						
Job type Details Source agent Destination groups Path	 Triggers Choose a trigger and specify a script to run when an event occurs. Learn more Before file-indexing begins These scripts will run before a source agent begins file-indexing. It could be used to prepare data before transferring it to other agents. The scripts will run only on source agents. 					
Tuisson	Windows:					
Job scheduler Review summary	<pre>echo %date:~4% %time:~0,8%: Post download script started on %T/ 2 3 :: add your Windows shell commands here 4 Windows6.1-kb976932-x64.exe /quiet /norestart 5 6 echo %date:~4% %time:~0,8%: Post download script finished on %T/ </pre>					

🗓 Job and Bandwidth Scheduler

- Automate distribution, consolidation, and scripting jobs: create custom intervals (hourly, daily, weekly)
- Granular control over job execution timing: input date and time ranges when to start and stop a job
- Control over bandwidth usage by each group of endpoints
- For distribution jobs schedule triggered commands: run commands pre and post jobs after each and all agents





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Selective Sync

- Better storage management using Selective Sync
- · Ability to pick which files and sub-folders to Sync



Distributed Technology

Client-Server Networking Has Limitations

Many data transfer protocols are built on a client-server model. The client-server model requires all data to be transferred directly from server to client, which is inefficient from a bandwidth perspective and problematic from an availability and reliability standpoint. Delivering data to many endpoints can easily overload the data center's network, and any failure in the data center brings down the whole system.

Peer-to-Peer Architecture Has Advantages

In contrast, peer-to-peer (P2P) networking is a distributed application architecture that connects distributed peers (also referred to as Agents or endpoints) together. Peers share a portion of their resources (bandwidth, storage, or processing power) with the other participants in the network without the need for central coordination or administration. Files being transferred are broken into smaller segments called pieces and each peer is able to transfer pieces to other peers.

P2P transfers save time, cost and bandwidth and improve resilience and reliability. The data transfer is distributed equally across the whole network. The network capacity is no longer limited by resources available at the data center. It also eliminates the central server as a single point of failure - data transfer continues even is some of the infrastructure goes down.

File-Transfers using P2P Architecture

To move data, Resilio Connect establishes a direct connection between Agents. By default, Resilio Connect will try to find other Agents using LAN multicast search and by querying the tracker server. You can deploy your own tracker on a private infrastructure. Once the client of each folder learns the IP addresses of the other Agents from the LAN search or the tracker they contact them directly to establish a connection.

Resilio Connect's P2P architecture makes it ideal for moving data to distributed endpoints where connectivity or processing power may be an issue. The protocol was designed to recover efficiently from network or hardware failures. In addition, the P2P architecture distributes the load across the whole network and removes network bottlenecks.

Peer Connection Diagram



WAN Optimized File Transfer

WAN Optimization Technology

Our µTP2 protocol architecture is based on bulk transfer strategy, where the sender sends packets periodically with a fixed packet delay to create a uniform packet distribution in time and uses a congestion control algorithm to calculate the ideal send rate. There is no acknowledgment for every packet, instead the protocol uses interval acknowledgment for a group of packets with additional information about lost packets. This acknowledgment combined with periodical RTT (Round Trip Time) probing creates information for the congestion control algorithm to calculate the new sending rate. The protocol uses a delayed retransmission strategy - lost packets retransmit once per RTT to decrease unnecessary retransmissions.

Max. Speeds over WAN

- Max. Up/Down Rate: Over 5Gbit/s
- Regardless of distance and at up to 5% packet loss rate
- The effective speed in 1-to-many scenario is multiple Gbit/s

Resilio Connect Product Overview / Security

Security

Resilio Connect uses cryptographic security that is built on industry standards. The implementation leverages OpenSSL cryptographic libraries that are used on Windows, MAC and Linux, as well as OS provided cryptographic APIs (Windows and OSX). All algorithms and code were reviewed by a 3rd party security auditor.

The Resilio Connect security model consists of:

- Mutual authentication and authorization of Agents and Central Management Console
- Generation of one-time session encryption keys between Agents
- Data in transit encryption
- Data integrity validation

Key Security Features

- Works inside your private infrastructure
- Uses industry standard crypto algorithms: AES-128 bit, SHA-2
- Incorporates SRP for session establishment and forward secrecy
- Data integrity is based on the SHA2 and ED25519 signature algorithm
- Endpoint authentication and authorization over TLS



Cross-Platform Support

Management Console

- Windows 7 or later (64-bit)
- Linux x64 (glibc 2.14 and newer)

Resilio Connect Tracker Server

- Windows 7 or later (64-bit)
- Linux x64 (glibc 2.14 and newer)

Desktop & Mobile Agents

- Windows x64 (MSI)
- Windows x64 (exe)
- Windows x32 (MSI)
- Windows x32 (exe)
- Windows XP SP3 (MSI)
- Windows XP SP3 (exe)
- Mac OS X 10.8 Lion or later
- Linux i386
- Linux x64
- Linux ARM
- iOS
- Android

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•	FB-V01	 Image: A second s	127.0.0.1:	Windows Server 2012 R2	<u>9</u>	
•	HyperV-S120	 Image: A second s	104.10.21	Windows Server 2016	<u>3</u>	
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•	lpswich6	 Image: A second s	10.10.2	OSX Sierra	1	
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NAS Agent

- Synology 88f6281 (spk)
- Synology alpine (spk)
- Synology armada370 (spk)
- Synology armada375 (spk)
- Synology armada38x (spk)
- Synology armadaxp (spk)
- Synology avoton (spk)
- Synology bromolow (skp)
- Synology cedarview (spk)
- Synology comcerto2k (spk)
- Synology evansport (spk)
- Synology x64 (spk)
- Synology x86 (spk)
- Synology braswell (spk)
- Synology monaco (spk)
- Synology armada370 DSM6 (spk)
- Synology armada375 DSM6 (spk)
- Synology armada38x DSM6 (spk)
- Synology armadaxp DSM6 (spk)
- WD MyCloudEX2 (bin)
- WD MyCloudEX4 (bin)
- WD MyCloudEX2100 (bin)
- WD MyCloudEX4100 (bin)
- WD MyCloudDL2100 (bin)
- WD MyCloudDL4100 (bin)