ATTO 360™ Version 2.1
Tuning, Monitoring, and Analytics Software
Installation and Operation Manual

FastFrame N322

10/25GbE Dual Port PCIe 3.0 Network Interface Card

FastFrame N351

10/25/40/50GbE Single Port PCIe 3.0 Network Interface Card

FastFrame N352

10/25/40/50GbE Dual Port PCIe 3.0 Network Interface Card

FastFrame N311

10/25/40/50/100GbE Single Port PCIe 3.0 Network Interface Card

FastFrame N312

10/25/40/50/100GbE Dual Port PCIe 3.0 Network Interface Card

Thunderlink TLN3-3102

Thunderbolt 3 to 10Gb Ethernet Device

Thunderlink TLNS-3252

Thunderbolt 3 to 25Gb Ethernet Device

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The Power Behind the Storage

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ATTO 360™ Features and Overview

Overview

The following document provides a tutorial on how to use ATTO 360™ software to tune for network performance, monitor, and identify potential network issues when using ATTO FastFrame and Thunderlink Ethernet controllers on macOS, Windows, and Linux.

Getting Started

In general, to install the ATTO 360 application, you must:

1. Ensure you have the equipment and software you need for the installation:
   - FastFrame NIC or Thunderlink controller with Ethernet interface
   - A computer running macOS, windows, or Linux

Software Installation

Windows

2. Power on your system and log in as the administrator or a user with proper administrative privileges.
3. Go to https://www.atto.com/
4. Click on downloads
5. Register or log in if previously registered.
6. Click on software in the left dialog.
7. Navigate to ATTO Ethernet Suite for Windows in the right dialog and click on it.
   - ATTO Ethernet Suite includes an ATTO hardware driver for Windows 10 with option to install ATTO 360 and 360 View along with Driver installation
8. Scroll down to and click the Windows download.
9. A download window appears. Choose Save File.
10. Double-click the downloaded file to extract and launch the ATTO 360 Ethernet Suite.
11. Follow the on-screen instructions to complete the software installation.
    - Optional 360 View - if you decide to opt in and install 360 View a time series database will be stored on your local machine
    - If you are having issues with this feature please see “Linux troubleshooting guide” in this manual

Linux

1. Power on your system and log in as the administrator or a user with proper administrative privileges.
2. Go to https://www.atto.com/
3. Click on downloads
4. Register or log in if previously registered.
5. Click on software in the left dialog.
6. Navigate to ATTO 360 Ethernet Suite in the right dialog and click on it.
7. Scroll down to and click the Linux version of ATTO Ethernet Suite
   - ATTO Ethernet Suite is an installer package that includes ATTO hardware driver as well as ATTO 360 software and otional 360 View time series database
8. A download window appears. Choose Save File.
9. After the download has completed, open the ATTO 360 volume on the desktop.
10. Open the Linux folder.
11. Copy the .tgz file to a temporary folder.
12. Open a terminal window and change the location of the copied tgz.

13. Extract the file using the command tar -xfz <filename.tgz>.
14. Change to the directory created above then run the installer script ./install.sh.
    - To Install ATTO 360 only and not the ATTO hardware driver, skip the driver by setting this in the environment before running the installer:

      OFED_SKIP_INSTALL=Yes

    - To skip the firmware tool install, set this in the environment before running the installer:

      MFT_SKIP_INSTALL=Yes

    - **Optional 360 View** – if you decide to opt in and install 360 View a time series database will be stored on your local machine
      - 360 View uses "podman" which will need to be installed on your machine. Please see the 360 View troubleshooting section below for more info

Note ***TCP ports 3000, 9090, and 27092 are required to use this feature, please make sure these ports are open and available.***

- Use this command to assign port

  sudo env GRAFANA_PORT=3001 ./path/to/installer.sh

- If you are having issues with this feature please see troubleshooting guide on Page 6

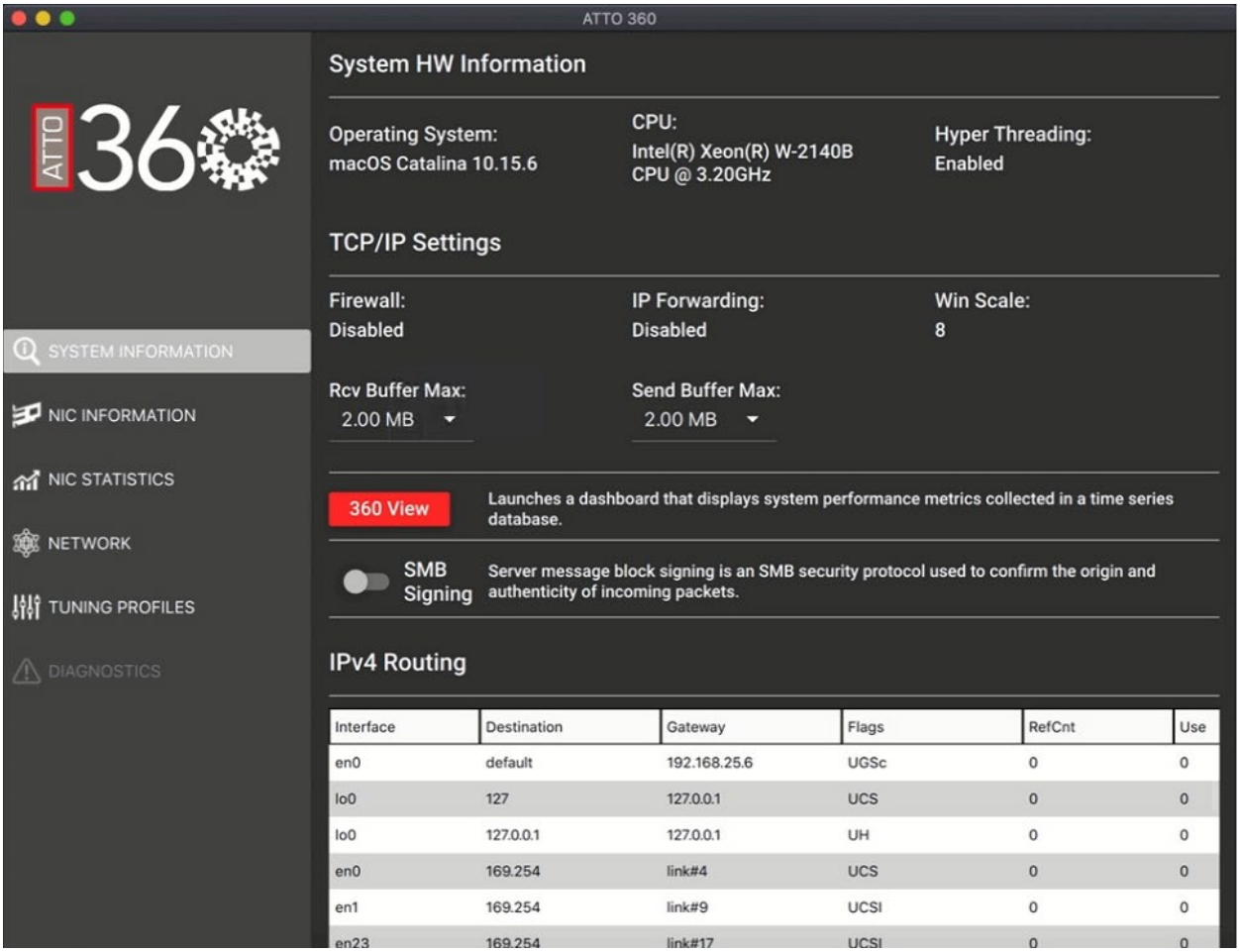
macOS

1. Power on your system and log in as the administrator or a user with proper administrative privileges
2. Go to https://www.atto.com/
3. Click on downloads.
4. Register or log in if previously registered.
5. Click on software in the left dialog.
6. Navigate to your ATTO 360 in the right dialog and click on it.
7. Scroll down to and click the macOS download version
8. A .dmg file for ATTO 360 and 360 View will appear on your desktop
9. Click on ATTO 360 icon to install ATTO 360, click on 360 View icon to install the optional 360 View
10. Follow the on-screen instructions.
    - • **Optional 360 View** – if you decide to opt in and install 360 View a time series database will be stored on your local machine.

Note ***DRIVER UPDATE NEEDED – ThunderLink and FastFrame 3 macOS driver version 1.07 or later is required for 360 View to work properly.***

- If you are having issues with this feature please see troubleshooting guide on Page 6

System Information



System information is the first screen that loads when you launch ATTO 360™

Here you can access relevant information about your system in one convenient area. You can identify items like Operating System, CPU and see TCP/IP settings like Receive/Transmit Buffers, TCP Window Scale, firewall, IP forwarding, and hyper-threading.

SMB signing – Server message block signing is an SMB protocol used to confirm the origin and authenticity of incoming packets, SMB signing can cause a drop in performance and should only be used when you have security concerns and are uncertain about the origin on incoming packets - *this feature is available on macOS only*

IRQ Balancing – Interrupt request line blocking distributes hardware interrupts across processors on a multiprocessor system in order to increase performance - *this feature is available on Linux only*

This screen also contains two routing tables, one for IPv4 traffic and one IPv6 traffic. These tables show the topology of the networks on your machine.

360°View

360°View is a new feature built into ATTO 360 Version 2.0. Clicking the “launch” button from the System Information tab will open the 360°View dashboard that shows performance and other key metrics displayed over time.

This feature must be enabled during installation, please see installation instructions on how to get 360 View installed.

Note ***TCP ports 3000, 9090, and 27092 are required to use this feature, please make sure these ports are open and available.***

Note ***if you are having problems viewing data or launching 360 View’s dashboard you can find suggestions on our [360 View troubleshooting guide]***

Troubleshooting guide for 360 View

Linux Users

For 360 View on the Linux platform we utilize podman container, the minimum version of podman required for 360 View to work properly is v1.8.1. Updating to the latest version of podman is encouraged. Please follow these instructions;

1. Install podman from the distribution using this command;

   sudo yum install podman

2. To check which version of podman you're running use this command;

   sudo podman version

3. Update to the latest podman;

   https://podman.io/getting-started/installation

4. We have seen an issue running `yum update` after this where it upgrades a container module, which alters a config file and causes issues for certain CENTOS users, to avoid please disable the repo after installing podman using this command;

   sudo yum-config-manager --disable devel_kubic_libcontainers_stable

CENTOS 8 users may need to follow these update instructions:

sudo dnf -y module disable container-tools

sudo dnf -y install 'dnf-command(copr)'

sudo dnf -y copr enable rhcontainerbot/container-selinux

sudo curl -L -o /etc/yum.repos.d/devel:kubic:libcontainers:stable.repo https://download.opensuse.org/repositories/devel:/kubic:/libcontainers:/stable/CentOS_8/devel:kubic:libcontainers:stable.repo

sudo dnf -y install podman

Note ***CENTOS 8.3 users have Podman installed already and do not need to take these steps***

Mac Users

macOS users will need to update their FastFrame or Thunderlink driver to version 1.06 or later for 360 View to work properly.

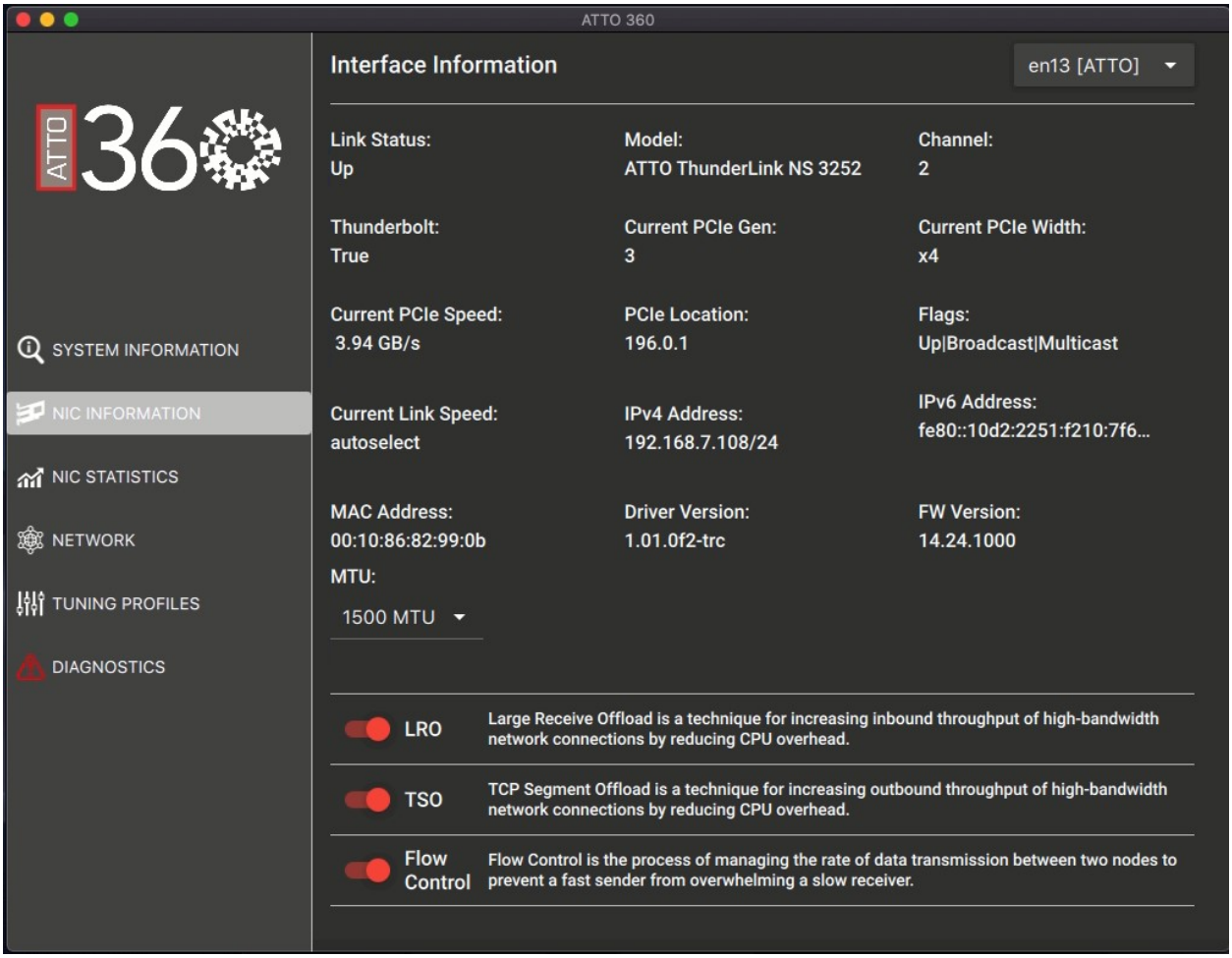
ALL users

360 View's dashboard run on a web browser, the latest versions of the following browsers are supported;

- Chrome/Chromium
- Firefox
- Safari
- Microsoft Edge

Note ***Internet Explorer is NOT supported and dashboard will not load properly.***

5 NIC Information



NIC Information is the second option available in the left-hand menu.

Select the network interface you would like to display information for in the top drop down box. You will see several interfaces, each representing a single Ethernet port. Ports connected to ATTO adapters or Thunderlink devices will be highlighted in red with [ATTO] next to their number identifier.

When you select a corresponding ATTO interface you will be given access to several points of data about your NIC including, Link status/speed, Model, channel, current PCIe slot, PCI location, flags, MAC address, MTU size/selection, RSS profiles (Linux and Windows), driver version, network services(macOS only), and firmware version.

You can also adjust several important settings that help in fine-tuning the performance of your NIC and can affect throughput positively or negatively.

aRFS - Accelerated Receive Flow Steering is a technique where packets are forwarded based on the location of the application consuming the packet directly to a CPU that is local to the thread consuming the data. – *Linux only*

GRO – Generic Receive Offload is a widely-used software based offloading technique to reduce per-packet processing overheads. – *Linux only*

LRO – Large Receive Offload is a technique for increasing inbound throughput of high-bandwidth network conditions by reducing CPU overhead.

TSO – TCP segmentation Offload is a technique for increasing outbound throughput of high-bandwidth TCP network communications by reducing CPU overhead.

RSC – Receive Segment Coalescing enables network card miniport drivers to coalesce multiple TCP segments and indicate them as a single coalesced unit. – *Windows only*

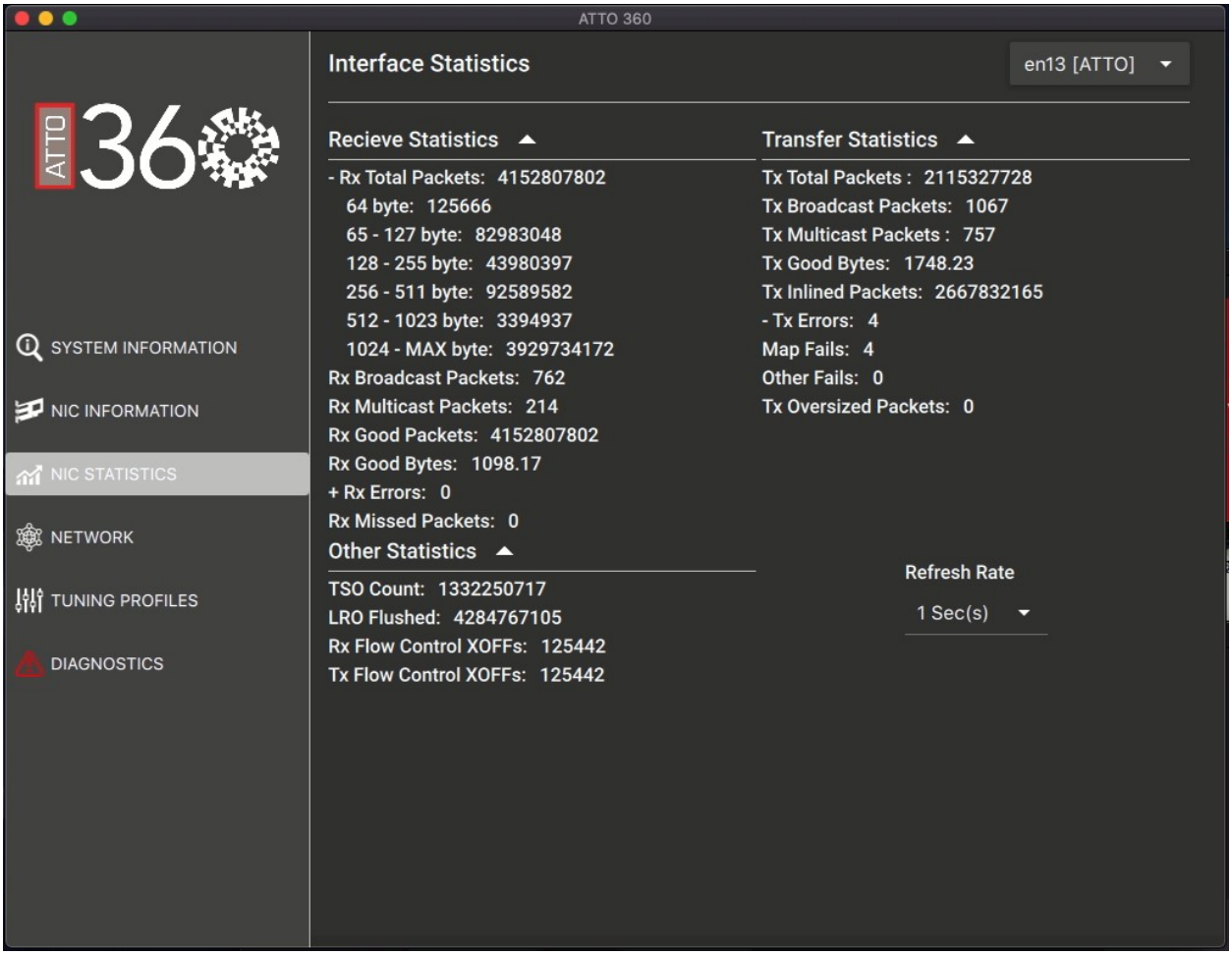
LSO – Large Send Offload is a technique for increasing outbound throughput of high-bandwidth network communications by reducing CPU overhead. – *Windows only*

RSS - Receive Side Scaling is a network driver technology that enables the efficient distribution of network receive processing across multiple CPUs in multiprocessor systems. – *Windows only*

Flow control – Flow control is the process of managing the rate of data transmission between two nodes to prevent a fast sender from overwhelming a slow receiver.

Striding RQ – Enables a striding queue that offloads packet processing helping users deal with smaller packet traffic (not supported by FFRM-N351 and N352)

6 NIC Statistics



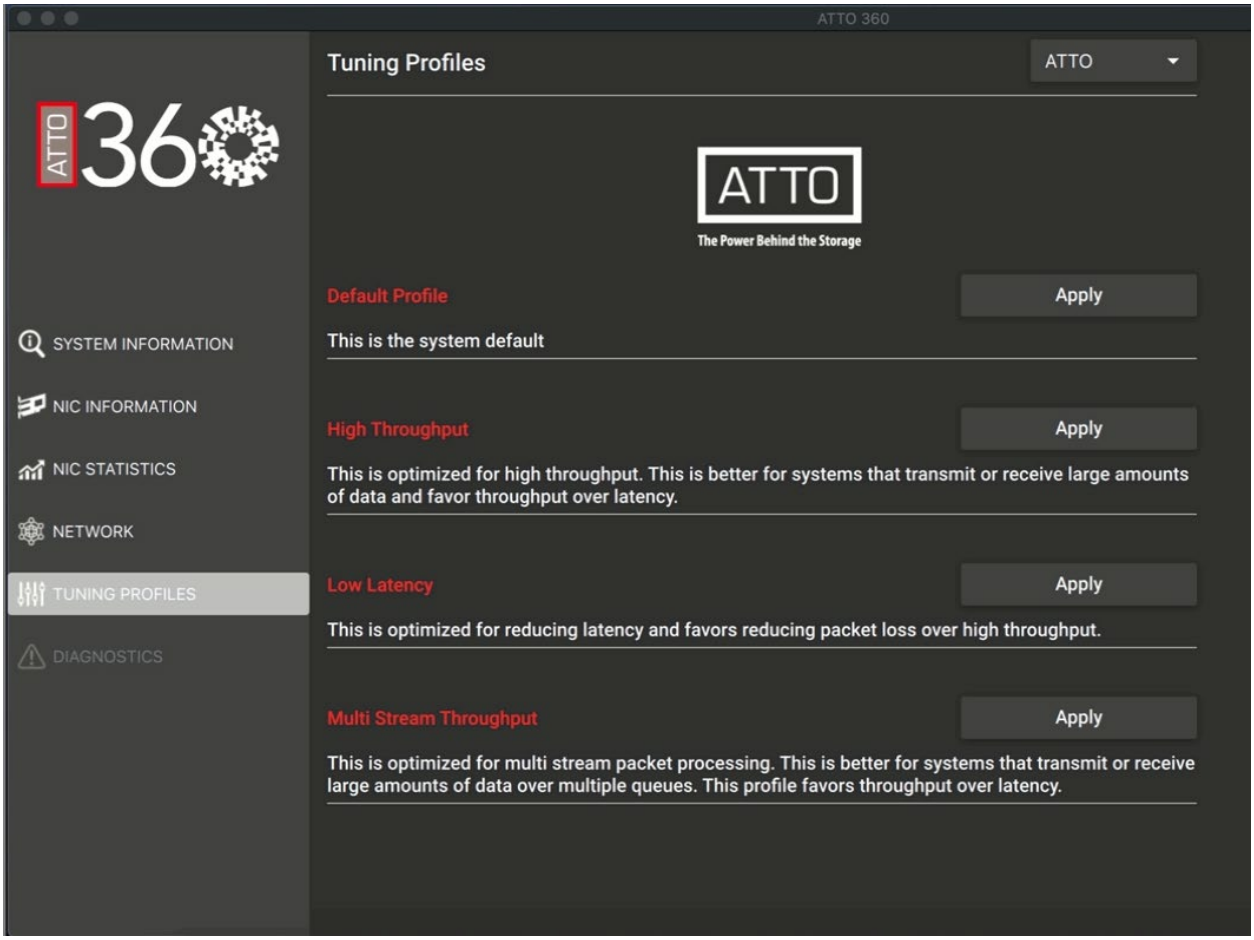
The NIC Statistics page allows the user to monitor Layer 2 Frame statistics and offer a view into Layer 1, for the purpose of assisting with troubleshooting issues and offering insight into performance-tuning opportunities.

Term	Definition
Rx Total Packets	Total number of all packets received (unicast, broadcast, multicast), regardless of length, errors, or L2 filtering, but excluding flow control packets.
Rx Broadcast Packets	Number of good (non-erred) broadcast packets received while the broadcast address filter is configured to allow reception of broadcast packets.
Rx Multicast Packets	Number of good (non-erred) multicast packets received that pass L2 filtering, excluding broadcast packets and flow control packets.

Rx Good Packets	Number of good (non-erred) packets received that pass L2 filtering and have a legal length. Counts of good packets received are also displayed by packet size.
Rx Good Bytes	Total number of all bytes received in good (non-erred) packets from the field through the field, inclusively.
Rx Errors	Total number of errors in packets received. When errors are displayed, check SFP, cable, MTU as well as local or remote interfaces.
CRC Errors	Number of packets received with CRC errors, not including packets whose length is less than 64 bytes (Fragments) or greater than the max packet size (Jabbers).
Illegal Bytes	Number of packets received with illegal byte errors, such as an illegal symbol in the packet.
Length Errors	Number of packets received whose packet length field in the MAC header doesn't match the actual packet length.
Undersize Packets	Receive undersize errors: Received frames that are shorter than the minimum size (64 bytes) and have a valid CRC.
Oversize Packets	Receive oversize errors: Received frames that are longer than the configured maximum packet size and have a valid CRC.
Fragments	Receive fragment errors: Received frames that are shorter than the minimum size (64 bytes) and have an invalid CRC
Checksum Errors	Number of packets received that contain IPv4, TCP, UDP or SCTP checksum errors. Checksum errors are not counted when a packet has any MAC error (CRC, length, undersize, oversize, byte error or symbol error).
Allocation Fails	Number of packets that were dropped because of a memory allocation failure.
Rx Missed Packets	Number of packets received that were dropped because no buffer was available to receive the data. Check MBUF structures with netstat –m. Counts the total number of packets missed on all Traffic Classes (TC).
Tx Total Packets	Total number of all packets transmitted, including standard, secure, FC, and manageability packets.
Tx Broadcast Packets	Number of broadcast packets transmitted.
Tx Multicast Packets	Number of multicast packets transmitted.
Tx Good Bytes	Number of successfully transmitted bytes, including bytes from the field.

Tx Inlined Packets	Number of Inlined packets transmitted.
Tx Errors	Total number of errors in packets transmitted
Map Fails	Number of packets that were dropped because of an error mapping the packet memory.
Other Fails	Number of packets that were dropped due to a general failure.
Tx Oversized Packets	Oversize errors: Frames that are longer than the configured maximum packet size and have a valid CRC
TSO Count	Number of Transmit Segmentation Offload operations attempted (including attempts that may have failed)
LRO Flushed	Number of Large Receive Offloads operations flushed.
Rx Flow Control XOFFs	Counts of Ethernet Pause Frames (Flow Control). Flow control is a Link layer attempt to relieve the pressure on queues to avoid congestion. When an Ethernet device gets congested or over loaded, flow control allows it to send PAUSE requests to the transmitter until the over loaded condition dissipates. If flow control is not enabled and an over loaded condition occurs, the device will drop packets. Dropping packets will impact performance.
Tx Flow Control XOFFs	Counts of Ethernet Pause Frames (Flow Control). Flow control is a Link layer attempt to relieve the pressure on queues to avoid congestion. When an Ethernet device gets congested or over loaded, flow control allows it to send PAUSE requests to the transmitter until the over loaded condition dissipates. If flow control is not enabled and an over loaded condition occurs, the device will drop packets. Dropping packets will impact performance.

7 Tuning Profiles



The Tuning Profiles area contains 1-click settings for applying pre-designated NIC and system parameters that are designed to work with specific workflows and storage use cases. These profiles were designed by ATTO engineers to work best in certain environments.

Default – The system default.

High throughput – This is optimized for high throughput. This is better for systems that transmit or receive large amounts of data and favor throughput over latency.

Low Latency – This is optimized for reducing latency and favors reducing packet loss over high throughput.

Multi-stream Throughput – This is optimized for multi-stream packet processing. This is better for systems that transmit or receive large amounts of data over multiple queues. This profile favors throughput over latency.

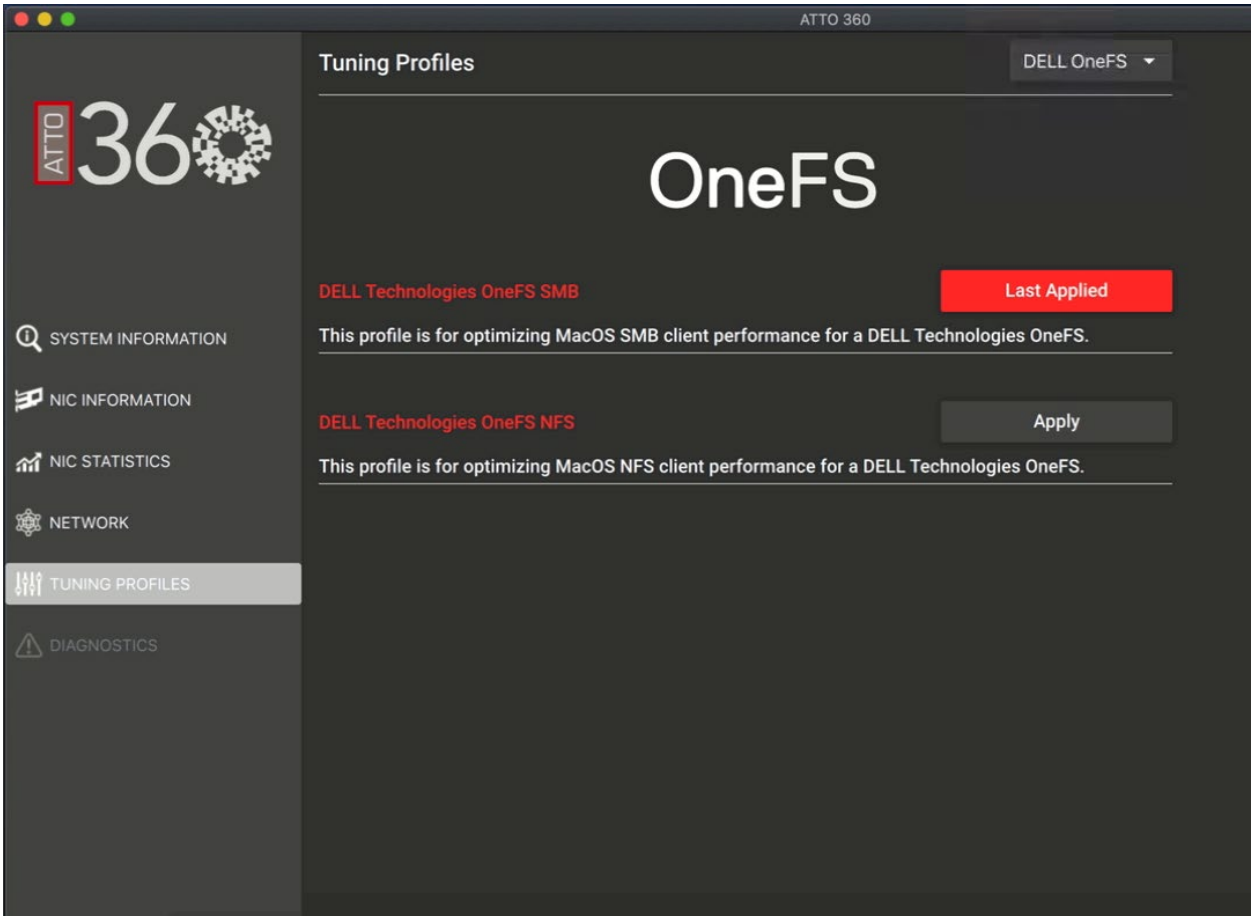
SMB – This profile is optimized for high throughput with SMB specific connections

NFS – This profile is optimized for high throughput with NFS specific connections

SMB MultiChannel – This profile is optimized for high throughput with SMB MultiChannel connections(Windows only)

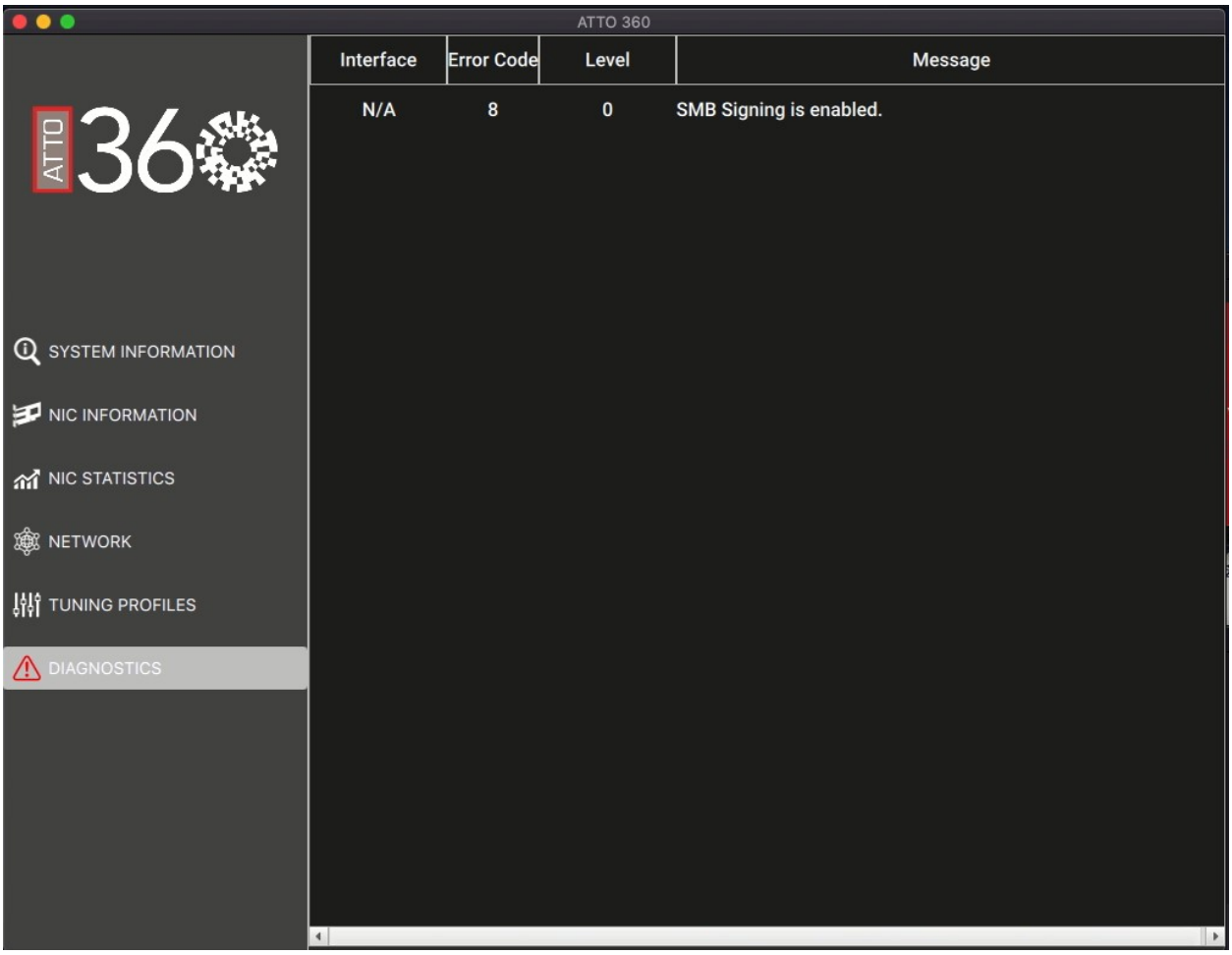
Partner Tuning Profiles

Partner tuning profiles can be accessed via the drop down menu in the ATTO Tuning Profiles Tab;



- Several custom Dell OneFS Tuning Profiles are available for Windows, macOS, and Linux. Select the type of network share you are using with Dell OneFS based storage (SMB, NFS, SMB-MultiChanel).
- Custom AVID Nexus profiles for Windows and macOS are available via the AVID section on the drop down menu
- Custom Autodesk profile for Linux is available via the Autodesk section on the drop down menu

8 Diagnostics



The Diagnostics menu will be highlighted red if the application recognizes settings that could be negatively impacting performance or connectivity. Selecting this option will present any built-in alerts that point to possible areas of concern or issues with performance.

Appendix A Glossary

Term	Definition
OS	Indicates which Operating System is installed on the system running ATTO 360. An operating system (OS) is system software that manages computer hardware, software resources, and provides common services for computer programs.
CPU	Indicates CPU model is installed on system running ATTO 360. A central processing unit (CPU) is the electronic circuitry within a computer that carries out the instructions of a computer program by performing the basic arithmetic, logic, controlling, and input/output (I/O) operations specified by the instructions.
Performance Mode	Indicates which CPU is running in high performance mode rather than power saving or sleep modes that would cause performance problems
Firewall	Indicates whether or not firewall is established.
IP Forwarding	Indicates whether IP forwarding is enabled/disabled.
Hyper Threading	Indicates whether Hyper Threading is enabled/disabled. Hyper Threading is a high-performance computing architecture that simulates some degree of overlap in executing two or more independent sets of instructions.
Receive Buffer	Displays size of receive buffer window. The buffer size of system memory that can be used by the adapter for receiving packets
Transmit Buffer	Displays size of transmit buffer window. The buffer size of system memory that can be used by the adapter for sending packets
Window Scale	Displays TCP Window Scale option. The TCP window scale option is an option to increase the receive window size allowed in Transmission Control Protocol above its former maximum value of 65,535 bytes.
Link Status	Displays whether Link Status is up or down.
Model	Indicates model number for the ATTO adapter that is currently installed
Channel	Indicates which Ethernet port the application is monitoring
Thunderbolt	Thunderbolt is the brand name of a hardware interface developed by Intel (in collaboration

	with Apple) that allows the connection of external peripherals to a computer.
PCIe Generation	Displays PCI Express generation NIC is running
PCIe Width	Displays PCIe width determining the number of lanes that can be used in parallel by the device for communication (i.e. x4, x8, x16)
PCIe Speed	Displays PCIe speed in gigatransfers per second
PCIe Location	Displays PCIe location
Link Speed	Displays the maximum speed in bits per second that your device can communicate with the device that it is linked to.
IPv4 Address	Displays IPv4 address. The IPv4 address is a 32-bit number that uniquely identifies a network interface on a machine.
IPv6 Address	Displays IPv6 address. An IPv6 address is a 128-bit value that identifies an endpoint device in the Internet Protocol Version 6 (IPv6) addressing scheme.
MAC Address	Displays MAC address. A media access control address of a device is a unique identifier assigned to a network interface controller.
MTU	Here you can change MTU size. Maximum Transmission Unit (MTU) is the size of the largest protocol data unit (PDU) that can be communicated in a single network layer transaction.
Driver Version	Displays what driver version is installed
FW Version	Displays what Firmware version is installed for the selected adapter