ATTO Technology, Inc.

ATTO FastFrame
Troubleshooting Guide

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1 OVERVIEW

This document describes troubleshooting techniques that can be used to identify and resolve issues associated with the ATTO FastFrame 10Gb Ethernet Adapter.

Before continuing with this guide, verify that the latest driver is installed for your operating system. The latest drivers can be obtained from the “Driver Download” section of the ATTO web site.

In addition to the steps listed below, we highly recommend you explore the following additional technical resources:

- Read the information posted in the support section of the ATTO web site [www.attotech.com/support]. The known issues and workarounds are listed.
- The known issues section of the Product Release Notes document may also be helpful in identifying a potential issue. Product Release Notes can be obtained in the “Driver Download” section of the ATTO web site.
- The “Product Manual” and “Getting Started Guide” explain proper techniques and tips used for installation, operation, and configuration of the network adapters. These manuals can be found in the download section of the ATTO web site.

ATTO spends a great deal of time testing third party applications and products. This testing ensures that each supported configuration performs as indicated and operates successfully. Interoperability matrices are available in the support section of the ATTO web site. While these are not all inclusive, the listed products are a good baseline for assuring that they have been tested and should work in your system. Storage and system providers’ web sites are the best sources for detailed configuration information including hardware and firmware/drivers/software for each component supported.

2 TROUBLESHOOTING TECHNIQUES

Troubleshooting is a logical, systematic search for the source of a problem. It is also a process of elimination. Gather your information, organize a list of symptoms and eliminate items that are working correctly.

- Observe and identify symptoms. A symptom can be defined as any unwanted results or behavior.
- A problem or failure might exhibit one or more symptoms.
- Isolate the cause of the symptom.
- Take action to correct the problem.
- Evaluate the system to see if the original problem is solved and to verify that new problems have not been introduced by the changes you made.
- At this point, either you have solved the problem, or you must return to Steps 1, 2, or 3 and identify the symptoms more clearly, isolate additional possible causes, or take additional action to correct the problem.

3 OBSERVATIONS

Take a step back and think about what is being observed. Ask the following questions:

- Has the configuration been working and all of a sudden now fails? If you can absolutely assure that nothing has changed, the issue is most likely due to a hardware failure. However, there are some very subtle changes that could have been made (maybe by a colleague) that could affect overall system behavior. What has changed? Has something been modified, added or taken away?

- What is the observed behavior compared to the expected behavior? When reporting an issue to ATTO, try to observe and report the overall “high level” problem as well as the details. Providing enough detail is important towards achieving a quick resolution.
- Is the problem repeatable? If yes, can it be repeated on a non-production test system? Collecting information such as system error logs is often needed. Since production systems are not generally set up to collect this information in normal operation, it is important to be able to configure the system to collect data and recreate the problem on a non-production test system.
- What do the status LEDs indicate? Check the adapter and switch LEDs to determine the status. Refer to the appropriate product manuals to gain an understanding of what the LEDs indicate, but they are usually a good source of information towards identifying root cause.

Record your observations. When an error is encountered, please insure you have an answer to each of the following questions when reporting it as an issue to ATTO Technical Support. This will expedite the ability to find a resolution tremendously.

QUESTION	ANSWER
1. Computer Model:	
2. Operating System and Kernel Version:	
3. PCI slot # and type:	
4. ATTO Driver version:	
5. ATTO Flash Bundle version:	
6. ATTO Configuration Tool version:	
7. Include the manufacturer, model number and firmware level for the switch:	
8. List the application(s) and version(s) that were running when the failure occurred.	
9. Did it ever work? Is this a new error that just started happening, or is this an error that has been existed since the first use?	
10. Does the error occur when you try it with a second host adapter (if possible)? For example, swap out one host adapter for another and see if error still occurs.	
11. Does the error occur when you try it with a different SFP (if possible)? For example, swap out one SFP for another and see if error still occurs	
12. Is the adapter in default mode? Are there settings that have been adjusted that may be causing the problem? Do settings need to be adjusted to allow the device to function properly?	
13. Can the error be reproduced easily? How often does it fail? Does the error occur sporadically/randomly, or can it be reproduced every time?	

4 PROBLEM ISOLATION

4.1 Common Problems

Common causes of connectivity problems are as follows:

- Network adapters and switch ports that have mismatching duplex levels or transfer speed settings
- Network adapters or switches with transmission rates that do not switch over correctly
- Cabling issues
- Malfunctioning SFP (optical transceiver)
- Configuration issues

4.2 Physical Layer

✓ **Check the physical connections, check your cables**

- Make sure that the correct Ethernet cable is installed and the cable lengths are within spec.

Interface	Cable	Transceiver	Committed Reach
10GSFP+Cu/10GBase-CRs (direct attach copper)	Copper with integrated SFP	Integrated SFP	10 m
10GBASE-SR	62.5/125 µm multi-mode fiber (OM1)	SFP+ short wave	26 m
10GBASE-SR	50/125 µm multi-mode fiber (OM2)	SFP+ short wave	82 m
10GBASE-SR	Laser Optimized 50/125 µm multi-mode fiber (OM3)	SFP+ short wave	300 m
10GBASE-LR	Single-mode fiber	SFP+ long wave	10,000 m
10GBASE-T	CAT-7	N/A	Full reach: 100 m
10GBASE-T	CAT-6a	N/A	Full reach: 100 m
10GBASE-T	CAT-6a	N/A	Short reach: 30 m
10GBASE-T	CAT-6	N/A	55 m
1000BASE-T	CAT-5e	N/A	Full reach: 100 m
100BASE-T	CAT-5e	N/A	Full reach: 100 m

- If using an optical interface, is it an SFP+ transceiver rated for 10Gb speeds on both ends?
- Is the adapter configured using the correct MAC address? A MAC address is the hardware address as opposed to an IP address which is a logical address. Check the settings in Device Manager, NetworkManager or System Preferences/Network. The settings can also be verified with command line tools such as ifconfig/ipconfig. The Media Access Control (MAC) address is a globally unique number from the ATTO FastFrame NIC. Every IP packet that is sent out of the ATTO FastFrame NIC uses the MAC address to direct traffic on your network.

These MAC addresses only have significance on the locally attached network. As the packet hops across the Internet, its source/destination IP address stays the same, but the MAC addresses are reassigned by each router on the way using a process called Address resolution Protocol (ARP).

✓ **Check the Ethernet LINK Indicator**

- Check the link LEDs on the switch and the ATTO FastFrame NIC. The LINK LED indicates whether or not there is a problem with connectivity. An illuminated link light indicates that you are using the correct type of cable and that the duplex has been negotiated correctly between the devices at both ends and signifies that the ATTO FastFrame NIC has successfully detected a device on the other end of the cable.
- The LINK LED indicator will be Green for a successful 10Gbps link or Amber for a 1Gbps link. If the LINK LED indicator is not on, check your cable, connectors and speed/duplex settings. Check that the adapter is seated correctly in the PCIe slot.

✓ **Check the Ethernet ACTIVITY Indicator**

- The Ethernet transmit/receive ACTIVITY LED indicator is Green when the Ethernet controller sends or receives data over the Ethernet network. If the Link indicator LED is illuminated but the Ethernet transmit/receive activity LED is off, check your interface settings, switch settings, if the OS has detected the ATTO FastFrame NIC and if the correct device drivers are installed for the ATTO FastFrame NIC.

✓ **Verify Configuration**

Review the following settings with Device Manager, Network Manager or System Preferences or the command line utilities ifconfig/ipconfig.

- Make sure that the correct device drivers are installed in the host and are at the current release level.
- Make sure that the device drivers on the client and server are using the same protocols.
- Is the interface negotiating the correct speed and duplex?
- Check the interface settings, interface statistics and link status on the ATTO FastFrame NIC.
- Is the interface enabled? Do the interface statistics show TX and RX packets?
- Is the adapter configured with a valid IP Address that works with your IP scheme?
- Do the TCP/IP devices connected to the Internet have an Internet Protocol (IP) address?

4.3 Data Link Layer

✓ **Is the interface up?**

- If the interface is up, its MAC address should be visible on the default router. Address Resolution Protocol (ARP) is used to map the MAC address to your IP address. Are other local host addresses in the local ARP cache? Is the default gateway in the ARP cache? Use the *arp* command to view the *arp cache*.

4.4 Network

✓ **Check routing and gateway**

- A router and the default gateway describe the pathways to non-local network segments. If a route is not explicitly listed in the route table then the packet is forwarded to the default gateway. Is the local interface up? Is the Route table correct? Subnetmasks tell what part of the IP address is the network and which is the host. Do you have the correct Default GW and Subnet mask? If these values are set wrong, transmitted packets will be misdirected. Use the *route* or *netstat* commands to review the route table on your host.

✓ **Are there Routing problems?**

- The Ping command sends ICMP echo and receives ICMP echo reply messages that confirm network connectivity. Check your connectivity with *Ping* and *Traceroute*. Be aware that a

Host can be configured to ignore ICMP (ping packets). Some administrators set up their firewalls to restrict ICMP packets for security reasons. Firewalls may be running on individual hosts or on network segments.
    - Ping may return these errors. “Request timed out” There was no reply from the host.
    - “Destination host unreachable” There is no route to the destination.
- Check your Firewall, is it blocking the ICMP packets from your ping command tests?
- Review the output of the trace route command, to identify the path a frame takes to its destination. This command, can help diagnose routing problems.
- Do you have a correct IP address scheme?
- If you configure the adapter with DHCP, then is all of your DHCP configuration correct on the Host? Dynamic Host Configuration Protocol (DHCP) automates the assignment of the IP address, subnetmask and default routers. Use the *netstat* and *ifconfig* or *ipconfig* commands to determine the values of your settings.

4.5 Transport

✓ **Check for Connectivity issues**

- Use the *PING* command to ping 127.0.0.1 (which is called localhost). It is the “virtual loopback interface” used to check the local stack. If you receive an error or if the transmission fails, the network card is not physically installed into the computer correctly, has the incorrect drivers, or the ATTO FastFrame NIC is bad.
- Can you ping a host on the local network?
- Can you ping the gateway?
- Can you ping the router interface?
- Can you ping another host by IP address but not by name?
- Does your browser work with IP addresses but not with DNS names?
- If you can ping or browse by IP but not name, then you have a DNS issue.
- Domain Name System (DNS) is a protocol used to translate easy-to-remember domain names into an IP address.

4.6 Application

✓ **Check logs and statistics**

- Check the logs for error messages. Logs can be stored in various locations on a system, check your system documentation to determine the locations.
- The *netstat* command is useful for reviewing interface statistics.
- Check for operating system specific causes of the problem.
    - In Windows check the system “event logs” for messages.
    - In Linux check the “messages” log.

4.7 Performance issues

✓ **Check your system documentation to determine the correct PCI connector.**

- The FastFrame adapter supports PCIe 2.0 x8. It will function in slower PCIe slots, but the performance will be limited. Some PCI-e x8 slots are actually configured electrically as x4 slots. These slots may limit 10Gb Ethernet bandwidth.

The following commands and tools, should be reviewed and understood, to aid in troubleshooting.

4.8 Windows Services and Troubleshooting tools

arp	Allows viewing and editing of the Address Resolution Protocol cache
Event Viewer	Records errors and events.
hostname, sconfig	Display/set the host name of the computer.
ipconfig	Displays the current TCP/IP configuration, manage Dynamic Host Configuration Protocol (DHCP)-allocated IPv4 address configurations, display or flush the DNS client resolver cache, and register DNS names.
nbtstat	Displays NetBIOS over TCP/IP (NetBT) protocol statistics, NetBIOS name tables for both the local computer and remote computers, and the NetBIOS name cache.
netdiag	A command-line diagnostic tool that helps to isolate networking and connectivity problems by performing a series of tests to determine the state of your network client.
netsh	Configuration tool for many network services. For each network service, there is a context containing commands specific for that service. For the netsh interface ip and netsh interface ipv6 contexts, displays and administers TCP/IP protocol settings on either the local computer or a remote computer.
netstat	Displays active TCP connections, ports on which the computer is listening, Ethernet statistics, the IP routing table, IPv4 statistics (for the IP, ICMP, TCP, and UDP protocols), and IPv6 statistics (for the IPv6, ICMPv6, TCP over IPv6, and UDP over IPv6 protocols). Used without parameters, netstat displays active TCP connections.
network monitor	Tool to allow capturing and protocol analysis of network traffic.
nslookup	Performs DNS queries and displays the results.
pathping	Provides information about network latency and network loss at intermediate hops between a source and destination.
performance logs and alerts, performance monitor	Windows Performance Monitor combines the functionality of previous stand-alone tools including Performance Logs and Alerts (PLA), Server Performance Advisor (SPA), and System Monitor.
ping	A tool used to test whether a particular host is reachable across an IP network. Sends Internet Control Message Protocol (ICMP) Echo or Internet Control Message Protocol for IPv6 (ICMPv6) Echo

	Request messages to test reachability.
route	Allows viewing of the IPv4 and IPv6 routing tables and editing of the IPv4 routing table.
tracert	Sends ICMP Echo or ICMPv6 Echo Request messages to trace the network route taken by IPv4or IPv6 packets to a specific destination.listing of all the router hops between your server and the target server. This helps you verify that routing over the networks in between is correct.
SNMP service	Provides status and statistical information to Simple Network Management System. (SNMP)
telnet	Communicates with a computer running the Telnet Server service. Connect or test TCP connection establishment between two nodes.

4.9 Linux/OSX Services and Troubleshooting tools

arp	Manipulate the system ARP cache
curl, wget	text based tools to check web connectivity
ethtool, mii-tool	Display or change link status, statistsics and interface settings.
ifconfig, ip addr	A system administration utility to configure, control, and query TCP network interface settings.
ip	Show / manipulate routing, devices, policy routing and tunnels
iptables	firewall
nc	Service for reading from and writing to network connections using TCP or UDP
netstat, ss	Used to show TCP, UDP socket statistics, routing, list connections and status.
nmap	utility for network discovery and security auditing.
nslookup	Performs DNS queries and displays the results.
ping	network tool used to test whether a particular host is reachable across an IP network
route, ip route	Allows viewing of the IPv4 and IPv6 routing tables and editing of the IPv4 routing table.
tcpdump	Tool to allow capturing and protocol analysis of network traffic.
traceroute	listing of all the router hops between your server and the target server. This helps you verify that routing over the networks in between is correct.

5 CONTACT INFORMATION

You may receive customer service, sales information, and technical support by phone Monday through Friday, 8:00 am to 6:00 pm Eastern Standard Time, or by email and web site contact form.

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