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Product Manual 35097 (Revision -, 3/2018) Original Instructions

Security Appliance Tofino Xenon Firewall

Configuration and Service Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

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Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

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Translated

Publications

Contents

Contents		3
Illustrations an	d Tables	4
Warnings and	Notices	5
Electrostatio	Discharge Awareness	6
Safety Syml	pols	6
Regulatory Co	mpliance	7
Chapter 1.	General Information	8
Introduction		8
Purpose and	d Scope	8
Intended Ap	plications	8
Chapter 2.	Reference Documents and Information:	9
Applicable V	Voodward Part Numbers:	9
Woodward I	Documentation:	9
Manufacture	er Resources:	9
Chapter 3.	Installation and Connections	10
Chapter 4.	Configuring the Firewall:	11
Connect to t	he Firewall	11
Status/Over	view Screen	14
System Con	figuration	15
Configure F	irewall Security	21
Configure N	etwork Assets	22
LSM Installa	ition and Licensing	23
PCAP/Wires	shark Interface	24
Configuratio	n Compliance Interface	25
Chapter 5.	LED Status/Troubleshooting Guide	
Chapter 6.	Product Support and Service Options	27
Product Sup	port Options	27
Product Ser	vice Options	27
Returning E	quipment for Repair	
Replacemer	nt Parts	
Engineering	Services	
Contacting \	Noodward's Support Organization	
Technical A	ssistance	
Glossary		
Revision Histo	ry	

Illustrations and Tables

Figure 3-1 Device Panel Connections	10
Figure 4-1 Service Connections	13
Figure 4-2 Typical Operation Connections	13
Table 4-1 Default Configuration Comparisons	11

Warnings and Notices

Important Definitions



This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER - Indicates a hazardous situation, which if not avoided, will result in death or serious injury. **WARNING** - Indicates a hazardous situation, which if not avoided, could result in death or serious injury. **CAUTION** - Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. **NOTICE** - Indicates a hazard that could result in property damage only (including damage to the control). **IMPORTANT** - Designates an operating tip or maintenance suggestion.

WARNING Overspeed / Overtemperature / Overpressure	The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage. The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.
	The products described in this publication may present risks that
	could lead to personal injury, loss of life, or property damage.
	Always wear the appropriate personal protective equipment (PPE) for
Personal Protective	not limited to:
Equipment	Eye Protection
	Hearing Protection
	Hard Hat
	Safety Boots
	Respirator
	Always read the proper Material Safety Data Sheet (MSDS) for any
	working fluid(s) and comply with recommended safety equipment.
	Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or
Start-up	property damage.

WARNINGAutomotive
ApplicationsAutomotive
ApplicationsOn- and off-highway Mobile Applications: Unless Woodward's
control functions as the supervisory control, customer should install
a system totally independent of the prime mover control system that
monitors for supervisory control of engine (and takes appropriate
action if supervisory control is lost) to protect against loss of engine
control with possible personal injury, loss of life, or property
damage.

Electrostatic Discharge Awareness

NOTICE	Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:
Electrostatic Precautions	 Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control). Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards. Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices. To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.

Follow these precautions when working with or near the control.

Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic 1. materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.

Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely 2. necessary. If you must remove the PCB from the control cabinet, follow these precautions:

Do not touch any part of the PCB except the edges.

Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.

When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Safety Symbols

- Direct Current
 - Alternating Current
 - Both Alternating and Direct Current

Caution, risk of electrical shock



Caution, refer to accompanying documents

Protective conductor terminal

Frame or chassis terminal



Regulatory Compliance

European Compliance for CE Marking CE

North American Compliance: FCC EN 61131-2 EN 60950-1

Optionally Available:

UL 508 ATEX Zone 2 ISA 12.12.01-Class I, Div. 2 IEC 61850-3 IEEE 1613

Chapter 1. General Information

Introduction

The Tofino Xenon is an industrial Firewall with Loadable Software Modules (LSM). The security appliance provides network segmentation, policies, Layer 2/3/4 filtering, and Denial of Service (DoS) rate limit controls. Deep Packet Inspection (DPI) monitoring of Modbus communications is also available via the Enforcer LSM. The device has two (2) RJ45 10/100BaseT(X) and one (1) USB interface ports. The V.24 interface port is not activated by the firmware. The device is DIN-rail mounted (wall mount optional), supports dual 24 Vac or 12/24(1-4 A)/48 Vdc input voltage, and is available in standard (0 to 60 °C) and extended (-40 to 70 °C) operating temperature ranges.

Purpose and Scope

The purpose of this manual is to provide the necessary background information for installing, configuring, and operating the Tofino Xenon Firewall appropriately. Topics covered include mechanical installation, electrical wiring, firmware installation, software configuration (via service tools), as well as troubleshooting and diagnostic information.

Intended Applications

The combined firewall and Modbus TCP network communication security functionality of the Tofino Xenon is well suited for creating and protecting industrial control system networks. Woodward 26479 MicroNet Cyber Security Manual describes how this device can provide a security boundary between embedded control systems (LAN) and either a security DMZ or a customer WAN. The Tofino Xenon is similar to, and often used in combination with, the MOXA EDR-810 to create cyber secure MicroNet Plus control systems.

Chapter 2.

Reference Documents and Information:

Applicable Woodward Part Numbers:

1711-1385 (Firewall) 10-004-487 (Firmware file *.tfo) 10-004-488 (Configuration file 10-004-488.tpf) 10-004-489 (License Activation Key – Manufacturer Assigned, Appliance Specific) **Woodward Documentation:**

26479 MicroNet Cyber Security Manual

Manufacturer Resources:

https://www.tofinosecurity.com/products/ Tofino Configurator

Chapter 3. Installation and Connections

The device is DIN-rail mounted (wall mount optional) and supports dual 24 Vac or 12/24(1-4 A)/48 Vdc input voltage power supplies. Additional details and mounting dimensions are available in the Tofino Xenon Installation Guide.pdf.



	1 2	
3	Ethernet port 1 NET 1	
	alternatively, depending on	RJ45 socket for 10/100 Mbit/s twisted pair connections
	device variant	DSC multimode socket for 100 Mbit/s F/O port
4	Tofino ID	
5	Ethernet port 2 NET 2	
	alternatively, depending on	RJ45 socket for 10/100 Mbit/s twisted pair connections
	device variant	DSC multimode socket for 100 Mbit/s F/O port
		DSC singlemode socket for 100 Mbit/s F/O port
6	Grounding screw	
7	Hole for mounting using a wall n	nounting plate
8	Locking gate for removing the de	evice
9	V.24 interface The V.24 interface is not active	in this version of the firmware.
10a	2 pin, screwable terminal block	for digital input
10b	Terminal block connection	
11	USB interface	
12	Save/Load/Reset button	

Table 6: Front view (using the example TofinoXe-0200M2T1......)

Figure 3-1 Device Panel Connections

Chapter 4. Configuring the Firewall:

The Tofino Xenon appliance (P/N 1711-1385) is pre-configured with the default Woodward configuration 10-004-488 (10-004-488.tpf). Custom configurations (*.tpf) can be installed as described in the following procedures of this section.

Table 4-1 Default Configuration Comparisons compares parameters between the various configurations for the device.

	Configu	iration
Parameter	Firmware Default	Woodward Cyber Secure
Woodard Configuration P/N	N/A	10-004-488
Username (User/Admin)	N/A	N/A
Password (User/Admin)	N/A	ServiceUser@1
Operating Mode	Test	Operational
Port Net1	(public)	(public)
Port Net2	(secure/private)	(secure/private)
Modbus TCP Policy	N/A	
Communications Method	Both USB and Network	Network Only

Table 4-1 Default Configuration Comparisons

Connect to the Firewall

The firewall provides two (2) service connections: Encrypted USB port and a network connection from the Tofino Configurator to the NetConnect LSM service on the appliance. This section presents the network connection method.

Launch the TofinoConfigurator.exe service tool and then browse/select the desired configuration *.tpf file. The application will prompt you to enter the password credentials associated with the file (default for both User/Admin: ServiceUser@1). To proceed with view-only privileges, select CANCEL in the Admin login screen.

Tofino Xenon Firewall

Tofino Configurator			
📑 • 😂 🔛 • 🔛 • 🗈	⋒ × Q		¥ ▼ ⑦ Help ▼
🗞 Project Explorer 🛛 📄	😂 ToficnoXe_Cfg_CS_v0		
 ToficnoXe_Cfg_CS_v0 Tofino SAs Discovery Saset Templates Assets Special Rules 	Project Details Details specific to this project file Project Name: ToficnoXe_Cfg_CS_VO Project File: C\Users\w21902\DOX Project Revision: 1 (0x3AD8) Creator: w22234 Last Modified By: w22234 Company: Woodward Inc. Project Protection The protection method for this project ♥ License Activation Key ♥ Password Administrator Password Administrator protection settings for this ♥ ♥ Use Administrator Password Iso Administrator Password	change Password	 Getting Started Work through these steps to set up your project: a Define the Tofino SAs: Define a Tofino SA for each physical device in the field. You can create a new Tofino SA or discover devices already configured on the network. You will transfer the configurations from the Tofino Configurator to the actual Tofino SAs installed on your network. Click Tofino SAs in the Project Explorer view. Define Assets: Create objects to represent the real world devices and systems on the control network both physical devices and virtual entities. These will be used to create firewall rules. Define Firewall Rules: Create firewall rules to control how the Tofino SA will handle network traffic. Combine the assets you defined with predefined protocols to build the rules. Define the Event Logger (optional): Configure the Event Logger LSM to take advantage of external alarm and event logging. Specify the type of events you want to collect and where you want to store the log files. Cireate the configuration: After installing the Tofino SAs in the field, transfer the Tofino SA configuration data to the devices. You can do this over the network or with a USB storage device. Weify the configuration: Verify the configuration load reports returned from the Tofino SAs when configuration of the Tofino SAs in the field. Select a Tofino SA and click Verify in the toolbar.

It is recommended to place the appliance in TEST mode prior to changing the configuration. This minimizes the impact to the public network by allowing all traffic to pass and only flagging traffic which would otherwise be blocked.

If the router has been configured previously and no knowledge about the configuration exists, press the SAVE LOAD RESET button on the firewall three (3) times and then wait 30 seconds for the device to reboot. This will erase all settings and restore the firmware defaults. The firmware default also places the appliance in TEST mode. Otherwise, TEST mode can be entered via the General tab, Status = Test after establishing a connection as described below.

Attach a cable from the local Ethernet connection on the service computer to the NET2 (secure/private) RJ45 port on the front of the firewall. Attach a second cable from the NET1 (public) RJ45 port on the front of the firewall to a physical network router/switch with access to the same Default Gateway as the service computer adapter. This creates a network loop from the service computer, through the Tofino Xenon, and back to the service computer. The connections in Figure 4-1 Service Connections are for servicing and configuring the appliance only. Typical connections for normal operation are illustrated in the EACMS Architecture diagram in the Woodward 26479 MicroNet Cyber Security Manual and below in Figure 4-2 Typical Operation Connections.



The appliance does not have or utilize an IP address for any interface connections. Traffic to/from the service computer must pass through (NET1 and NET2 ports) the appliance for the TofinoConfigurator.







Figure 4-2 Typical Operation Connections

If the router has been configured previously and no knowledge about the configuration exists, the Tofino Discovery feature will scan an IP address range and detect the appliance. First, identify the subnet of the network the service computer is connected to. Entering "ipconfig" at a cmd.exe prompt will identify the Default Gateway and Subnet Mask used by the service computer. For example, if the Default Gateway = 10.45.128.1 with Subnet Mask = 255.255.240.0, then the scan range would be Start IP = 10.45.128.0 and End IP = 10.45.143.255.

After the Start IP and End IP scan addresses are entered, click Start and any detected appliances will appear in the Tofino SAs directory as well as in the list on the Tofino SAs tab.

Tofino Xenon Firewall

Tofino Configurator			
	۹		💥 ▼ 🕜 Help 🔻
🗞 Project Explorer 🛛 📄	👌 Tofino Discovery		
 Source Cfg_CS_v0 Discovery Tofino SAs Tofino 00:50:C2:B3:2A:22 General Status Event Logger Firewall Assets Assets Protocols Special Rules 	Configuration The IP address range for this scan Start IP: 10 . 45 . 128 . 0 End IP: 10 . 45 . 143 . 255 Destination Folder: Tofino SAs Continuous Scan:	Results The results of this scan Estimated Run Time: Addresses: Last Scanned IP: Duration: # Tofino SAs Discovered: State: Iteration:	01 hrs, 07 mins, 58 secs 18 processed / 4096 total 10.45.128.17 17.519 seconds 1 Paused 1

Tofino Configurator								_ 🗆 🗙
	R 🗎 😂 New Folder 🛛 🖀 New To	ofino SA 🕹 Apply	🗟 Veri	fy 🛯 🛱 Firmware Updat	e 🔌 Retrieve Diagno	ostics 🔛	Generate PCAP	* • 💿
🗞 Project Explorer 🕞	👌 Tofino SAs							
▲	Name	Tofino ID	Mode	Configuration Status	Туре	Version	General Location	Specific Locatic
	Tofino 00:50:C2:B3:2A:22	00:50:C2:B3:2A:22	Test	Unknown	Tofino Xenon TX/TX	02.0.06		
Tofino 00:50:C2:B3:2A:22								
General								
🕼 Status 🐑 Event Logger								
Firewall								
🖻 🖉 Asset Templates								
Assets								
 Special Rules 								
	•			Ш	1			Þ

Status/Overview Screen

Navigate to Tofino SAs, <appliance MAC address>, General to view or set the Status Mode. Note that this is the screen where TEST mode can be set prior to configuration updates. Also note that the list of LSMs currently licensed in this example image includes the NetConnect LSM which is a prerequisite for network connections from TofinoConfigurator.

Tofino Xenon Firewall

Tofino Configurator					X
📑 🕶 🔚 🕶 🔤 🐇 🍳	😂 New Folder 🖀 New Tofino SA	🚳 Apply 😤 Verify 🧔 Firmware Update 🖇	🖁 Retrieve Diagnost	tics 🚟 Generate PCAP	
🗞 Project Explorer 🛛 📄	🖀 Tofino 00:50:C2:B3:24	A:22			
 Project Explorer TofinoXs. Cfg_CS_v0 Tofino SAs Discovery Tofino 00:50:C2:B3:2A:22 General Status Event Logger Firewall SexticeComputer SexticeComputer ServiceComputer Special Rules 	■ Tofino 00:50:C2:B3:2/ General The general identification details Tofino ID: 00 : 5 Name: Tofino 00:50: Description: General Location: Specific Location: Status DI Active: Image: Configuration Status: Latest Configuration Revision: Verified Configuration Revision: Verified Configuration Revision: Firmware Version: Verified Security Modules (LSN Select the LSMs you want to activity Present LSM Pricewall LSM V => Firewall LSM Price Logger LSM OPC Classic Enforcer LSM GOOSE Enforcer LSM GOOSE Enforcer LSM EtherNet/IP Enforcer LSM	A:22 for this Tofino SA 0 : C2 : B3 : 2A : 22 C2:B3:2A:22 c2:B3:2A	Network Interfr The settings for Net 1 Name: Net 2 Name: Net 2 Name: Net 2 Medium: Ocommunication The method of Network Onl USB Only Both USB an Contact Assets: 10.45.128.11 10.45.128.13 10.45.128.13 10.45.128.14	aces the network interfaces on this Tofino SA Net 1 Auto Net 2 Auto Is communication for this Tofino SA y d Network Discovery] [Discovery] [Discovery] [Discovery] [Discovery] [Discovery] [Discovery]	
					Ŧ

System Configuration

Load/Save a Configuration

Navigate to the Tofino S	SAs list and sele	ct the appl	iance	e to be config	gured				
Tofino Configurator									
1 - 6 - 4 - 4 - 4	ର୍ବ 😂 New Folder 🖀 New	Tofino SA 🕘 App	ly 🗟 Ve	erify 🛛 🖓 Firmware Upd	ate 🔌 Retrieve Diagi	nostics 🖁	Generate PCAP 🧯	Zedit Tofino SA	¥ 🔻 🕜 Help 🔻
🗞 Project Explorer 🛛 📄	👌 Tofino SAs								
ToficnoXe_Cfg_CS_v0 Tofino SAs	Name Tofino 00:50:C2:B3:2A:22	Tofino ID 00:50:C2:B3:2A:22	Mode Test	Configuration Status Unknown	Type Tofino Xenon TX/TX	Version 02.0.06	General Location	Specific Location	Description
Ø Discovery Tofino 00:50:C2:B3:2A:22 General									
Status Event Logger									
 Firewall Asset Templates Assets 									
ServiceComputer Protocols ServiceInsular									
Special rules									

Click the Apply command icon from the header

Apply Config	juration		
Apply Confi	guration		
Select the Tot method for a	ino SA(s) you want to config oplying the configuration.	ure and the appropriate	transport
Name		Transport Method Re	strictions
V 🖱 Tofi	no 00:50:C2:B3:2A:22		
Check All U	ncheck All		
Network ISB Drive			
Location:			Browse
	Use as default location		
		Finish	Cancel
rogress Informa	tion		
Establishing	a connection to "Tofino 00:	50:C2:B3:2A:22" via 10.45.	128.1 (1 of 10)
plying uploaded	l configuration		
		Cancel	Details >>
	Verification Result	-	×
	Verification Results:		
	▲ ✓ Successful		
	▷ Ӓ Tofino 00:50:C2	:B3:2A:22	
		ОК	

Verify Active Configuration:

Verification that the correct configuration is active in the appliance is possible using the Verify command icon.



It is not possible to download/retrieve the active configuration. Security of the configuration is discussed in the Load/Save a Configuration section.

Navigate to the Tofino SAs list and select the appliance to be verified Click on the Verify command icon in the header



Firmware Update

Navigate to the Tofino SAs list and select the appliance to be updated. Browse and select the desired firmware *.tfo file.





Firm	ware Update						
?	Please approve the effect level for the following Tofino(s):						
	- Tofino 00:50:C2:B3:2A:22						
	Effect Level 5 Update: "tofino_xenon_update_03_2_00-2017-10-04.bsi"						
	Network traffic passing through the selected Tofino will experience a long period of packet loss while applying this update. Interrupting this update will cause product failure. Please do not power off or reset the selected Tofino while applying this update.						
	Performing this update will cause network traffic passing through the selected Tofino to experience packet loss for 6 minutes. The current configuration in your Tofino Configurator will be applied to this Tofino SA once its firmware has been updated.						
	This update will move a Xenon from version 02.X.XX, 03.0.00, 03.1.00 to version 03.2.00.						
	Proceed with this update?						
	Yes No						

NOTICE

Manual 35097-

Do not power-cycle or RESET the appliance until the update has completed (approximately 6 minutes).

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Manual 35097-

Tofino Xenon Firewall

Progress Information	
Establishing a connection to "Tofino 00:50:C2:B3:2A:22" via 10.45.128.1 (1	of 10)
Uploading: tofino_xenon_update_03_2_00-2017-10-04.bsi	
Cancel	Details >>
Tofino SA Update	X
Tofino SA Update Complete Please review the results of the Tofino update.	
The following Tofino SA was updated successfully: ⁽²⁾ Tofino 00:50:C2:B3:2A:22	ОК

SIEM Log File Configuration

The standard event logging configuration utilizes a separate networked SysLog server. The Tofino appliance is configured to send all SIEM information to the server. In addition to the native interface of the SysLog server, the event logs can be viewed via TofinoConfigurator.

Navigate to the Tofino SAs tab Select the Tofino appliance to be configured/viewed Click on Event Logger

Tofino Configurator				_ D X
🔁 🕶 📾 🕶 🔛 🐇 🗎 🕷 🔍 🔍				💥 🔻 🕐 Help 🔻
🖕 Project Explorer 🛛 🕞	🖭 Tofin	00:50:C2:	3:2A:22 - Event Logger	
 ToficnoXe_Cfg_CS_v0 ToficnoXe_Cfg_CS_v0 Tofino SAs Discovery Tofino 00:50:C2:B3:2A:22 General Status Event Logger Firewall Sest Templates ServiceComputer ServiceComputer Protocols Special Rules 	Event Log The comm Syslog Sei Default G Destinatic Lowest Pri Show S	ger Settings nunication settin ver IP Address: ateway: in Port: ority Logged: iyslogs Tofino ID	Subord ACL Systog Address Systog Address Systog Address Systog Address The address from which systog messages will Tofino SA IP Address: O O O O O O O O O O O O O O O O O O	originate) . 0 . 0) . 0 . 0 ;A IP Address should be unique.
	•			,

Specify the IP address and Default Gateway of the SysLog server.

Select the threshold level for events (default is 5: Notice for normal, but significant conditions). Emergency events are always logged and larger threshold numbers will log additional events of lower priority.

Configure Firewall Security

Policies/Rules Table

Navigate to the Tofino SAs tab

Select the Tofino appliance to be configured

Click on Firewall

Current policies/rules are displayed. The +Create Rule and Suggested Firewall Rules command icons can also be used to modify the configuration.

Tofino Configurator																		X –
📑 🕶 🗁 🖬 🕶 😽 🗈 🙃 🗙	🖞 🔹 🗟 🔹 🖕 🕍 🖗 🕆 🖓 🔶 🖉 Create Rule 🗘 Move Up 🕹 Move Down 🖺 Suggest Firewall Rules 🛛 🖞 👻 🗇 Help 🔹																	
🕒 Project Explorer 🛛 📄	🖭 Tofino	00:50:C2:B3	3:2A:22	2 - Fire	wall													-
 ToficnoXe, Cfg.CS_V0 ToficnoXe, Cfg.CS_V0 Tofino DSAs Discovery Tofino D0:50:C2:B3:2A:22 General Status Event Logger Firewall Aset Semplates Asets ServiceComputer Protocols Special Rules 	Rule Table The firewa I # A II # A II 0 Fetch Fire Rule Dett Additiona E Gener Rate Lin	II rules configured Approx Hit Count wall Stats als al options for the s ral mit: 100	for this 1 DI Rule	Jofino SA Asset II Any N	nterface Net 1	Direction	Asset Any	Interface Net 2	Protocol	Permission Allow	Log	Type Standard	Details 100/second (b:1,000)	Description Default rule	a e to allow all <i>i</i>	ARP traffic. A	RP is n	=
	Burst Lir	mit: 1000																*

Modbus TCP Policy

Navigate to the Protocols tab Select the Common Industrial tab Click on MODBUS/TCP The current/active Modbus/TCP policy is displayed

Tofino Configurator							
🗂 🔹 🗁 📓 👻 🖄 🐇 🔍 🎬 🛍 🗶 🎬 New Folder 📽 New Protocol							
🕒 Project Explorer 📄	A MODBUS/	TCP If you wish to make changes to this read-only element, please make a	copy of it.				
 ToficnoXe_Cfg_CS_v0 Tofino SAs Tofino SAs Tofino 00:50:C2:B3:2A:22 General Status Event togger Firewall Asset Templates ServiceComputer Protocols Common Industrial BACnet/IP DNP3/TCP EtherNet/IP (CIP) Explicit Msg EtherNet/IP (CIP) Implicit Msg FF GOOSE PDU ICCP IEC:104 IEC:104/TCP IEEE 1588 / L2 MODBUS/LDP 	Protocol Details The details desci Protocol Name: Description: Protocol Type: Ports: Enforcer LSM:	ibing this protocol MODBUS/TCP Modicon Modbus protocol over TCP UDP ✓ TCP 502 Ports can be entered as a list of ranges separated by commas. Freedol 10 - 22 Modbus TCP Enforcer LSM					



Configure Network Assets

Navigate to the Assets tab The current/active assets authorized on the network are displayed

Tofino Configurator											- C X
📑 🕶 🗁 🖶 💌 🔤 👘 🗶 🔍 😂 Ne	🗂 🕶 🗟 🖌 🕍 🖄 🛠 🗋 🖄 X 🔍 🎬 New Folder 🖳 New Asset 🐨 Edit Asset 🐨 Detect Assets								💥 🔻 🕐 Help 🔻		
🔈 Project Explorer 🛛 🕞	😕 Assets										
ToficnoXe_Cfg_CS_v0 Ofino SAs	Name ServiceComputer	Type Computer	Manufacturer Dell	Model	General Location Fort Collins, CO	Specific Location Woodward WLC ITS	IP Address 10.45.128.20	Subnet Mask 0.0.0.0	MAC Address A4:4C:C8:0C:	Asset Tag Test	Description Service Computer
 Discovery Tofino 00:50:C2:B3:2A:22 General 											
🕅 Status 🖭 Event Logger											
Firewall Asset Templates Assets											
ServiceComputer											
 Special Rules Tofino Rapid Network Recovery Visuant Fundame Rule 											
🙀 vinnet explorer Rule											

LSM Installation and Licensing

Loadable Software Modules (LSM) are licensed individually and must be associated with the License Activation Key assigned to a specific appliance S/N. This requires an update and installation of a license grant file from the manufacturer. The process is as follows:

- 1. Open the Preferences dialog (upper-right corner) and select Licensing \rightarrow View Licenses
- 2. Note the License Activation Key

Licenses	X
License Property	Value
▲ ✓ Valid Licenses	
4 💹 TC License	
 Activation Key 	03YG0-07ATC-07J07-2V4F9-V90WQ
 Expiry Date 	None
 Vendor 	Tofino Security (A Division of Belden Cana
	Finish

- 3. Open the Preferences dialog (upper-right corner) and select Licensing → Export Project Summary File
- 4. Select the desired directory to save the *.psf file and click Save



- 5. Generate a License Grant file
 - 5.1. Open a web browser
 - 5.2. Login to the Tofino Customer Portal (Login required: <TBD email>, <TBD pswd>)
 - 5.3. Navigate to the Projects page and create a New Project
 - 5.4. Upload the *.psf file generated above
 - 5.5. Navigate to the License Grant page and create a License Grant file
- 6. Import the License Grant file
 - 6.1. Return to TofinoConfigurator
 - 6.2. Open the Preferences dialog (upper-right corner) and select Licensing → Import License Grant File
 - 6.3. Download the *.psf file to the appliance
 - 6.4. A pop-up dialog will indicate the status of the license upgrade

NET1 (public).

7. Update the configuration on the appliance to load and activate the new licenses

PCAP/Wireshark Interface

The standard configuration is NET2 (secure/private) and

Navigate to the Tofino SAs tab Select the Tofino appliance to be tested/debugged Click on the Generate PCAP command icon Select the desired parameters and specify the desired Save Directory for the PCAP file.

NOTICE

Tofino SA PCAP gen	eration V	Vizard		U		
CAP Settings						
Select the options to	generate	e PCAP				
Choose the interface Net 1 Net 2) вотн					
Choose between Tim	e and Co	ount opti	ons to rui	n PCAP:		
Time(in sec)	5					
Data Packet Coun	t 100					
Choose the directory	to save	PCAP file				
C:\Users\w21902\D	ownload	ls				
				Select S	ave Dire	ctory

When the specified time/packet-count is complete, a pop-up dialog will confirm that the PCAP file has been collected.



This *.pcapng file can be send to the system administrator or support team for troubleshooting and debug assistance.

📕 Т	ofino_Capture_2A_22_201	8.01.25.18.51.07.pcapng				x
<u>F</u> ile	<u>E</u> dit <u>V</u> iew <u>G</u> o <u>C</u> ap	ture <u>A</u> nalyze <u>S</u> tatistics	Telephony <u>W</u> ireless <u>T</u> ools	<u>H</u> elp		
	🔳 🖉 💿 🗼 🛅 🗙	🙆 ९ 👄 👄 🖀 🖉	2 📃 🔲 Q, Q, Q, 🎹			
A	pply a display filter <ctrl- :<="" td=""><td>></td><td></td><td></td><td>Expression</td><td>+</td></ctrl->	>			Expression	+
No.	Time	Source	Destination	Protocol L	ength Info	
	12 0.382168	Dell_01:ea:a7	Broadcast	ARP	60 Who has 10.45.140.92? Tell 10.45.128.140	
	13 0.384029	Dell_01:ea:a7	Broadcast	ARP	60 Who has 10.45.140.92? Tell 10.45.128.140	
	14 0.389528	10.45.128.10	239.255.255.250	SSDP	216 M-SEARCH * HTTP/1.1	
	15 0.515161	00:44:44:00:04:0f	Broadcast	ARP	60 Who has 10.45.140.28? Tell 10.45.128.185	
	16 0.525031	10.45.128.16	255.255.255.255	GVCP	50 > DISCOVERY_CMD	
	17 0.562933	10.45.128.205	239.255.255.250	SSDP	139 M-SEARCH * HTTP/1.1	
	18 0.611383	Dell_d0:ea:0e	Broadcast	ARP	60 Who has 10.45.140.162? Tell 10.45.128.81	-
	Frame 14: 216 bytes	on wire (1728 bits).	216 bytes captured (1728 bits)		
Þ	Ethernet II, Src: D	ell 59:a4:c8 (64:00:6	5a:59:a4:c8), Dst: IPv	4mcast 7f:	ff:fa (01:00:5e:7f:ff:fa)	
	Internet Protocol V	ersion 4, Src: 10.45.	.128.10, Dst: 239.255.	255.250	, ,	
⊳ t	User Datagram Proto	col, Src Port: 51798,	, Dst Port: 1900			
4	Simple Service Disc	overy Protocol				
	M-SEARCH * HTTP/	1.1\r\n				
	HOST: 239.255.25	5.250:1900\r\n				
	MAN: "ssdp:disco	ver"\r\n				
	MX: 1\r\n					
	ST: urn:dial-mul	tiscreen-org:service:	dial:1\r\n			
	USER-AGENT: Goog	le Chrome/63.0.3239.1	.08 Windows\r\n			
	\r\n					
	[Full request UR	I: http://239.255.255	<u>.250:1900*]</u>			
	[HTTP request 1/	3]				
	<u>[Next request in</u>	<u>frame: 201]</u>				
				1 1		
000	00 01 00 5e 7f ff	ta 64 00 6a 59 a4 c	8 08 00 45 00^	d. jYE		
003	10 00 ca 03 35 00	60 00 b6 b7 d5 4d 2	a 80 0a et tt5	; M CEA	 	=
001		40 20 00 07 05 40 20 48 54 54 50 2f 31 20	ע גע אר	ri-SEA	un H	
004	40 4f 53 54 3a 20	32 33 39 2e 32 35 3	5 2e 32 35 35 0ST: 2	39 .255.25	5	
00	50 2e 32 35 30 3a	31 39 30 30 0d 0a 4	d 41 4e 3a 20 .250:1	90 0MAN:		
0	Tofino_Capture_2A_22_	2018			Packets: 317 · Displayed: 317 (100.0%) · Load time: 0:0.1 Profile: Defa	ult _a

Configuration Compliance Interface

Configuration Compliance Monitoring systems may interface with the Tofino appliance via TofinoConfigurator. This allows the monitoring system to gather sufficient Tofino configuration information for detecting any changes. This one-time process is performed as follows:

- 1. Prepare the configuration compliance monitoring system as required
- 2. Start TofinoConfigurator in CCM (headless) mode from a cmd.exe prompt:
 - 2.1. Path_of_tofinoConfigurator.exe ccm path_project.tpf | more <TBD This command will be tested prior to release>
- After the configuration compliance monitoring system has been configured/trained, return the Tofino appliance to OPERATIONAL mode. This can be accomplished either by a power-cycle or via TofinoConfigurator (Mode = OPERATIONAL on the Tofino SAs, <appliance MAC address>, General tab).

Chapter 5. LED Status/Troubleshooting Guide



LED	Display	Color	Activity	Meaning
POWER	Supply voltage	_	None	Supply voltage is too low
		Yellow	Lights up	Supply voltage 1 or 2 is on
		Green	Lights up	Supply voltages 1 and 2 are on
NET 1	Link status	_	None	Device detects an invalid or missing link
and		Green	Lights up	Device detects a valid link
NET 2			Flashes 3 times a period	Port is switched off
		Yellow	Flashing	Device is transmitting and/or receiving data
FAULT	System and USB save/load errors	Red	None	The signal contact is closed - it is not reporting any detected errors.
			Very short flashing in cycles of 0.5 s	A detected USB load or save error occurred.
MODE	Network mode	Green	None	The device is in Unconfigured mode
			Lights up	The device is in operational mode.
			Long flashing	The device is in test mode.
SAVE/ LOAD	Preparation Saving process	Green	Lights up (5 s)	The saving of the device diagnostic or log files to the USB storage device is about to begin.
	Preparation Loading process	Yellow	Lights up (5 s)	The load of the configuration files from the USB storage device is about to begin.
RESET	Preparation Reset process	Yellow	Lights up (5 s)	The reset of the device to the factory defaults is about to begin.
MODE RESET	Execution Saving process	Green	Flashing alter- nately in left to right sequence	The device saves the diagnostic files or log files on the USB device.
	Execution Loading process	Yellow	Flashing alter- nately in right to left sequence	The device loads the configuration files from the USB device.
MODE SAVE/ LOAD RESET FAULT	Execution Reset process		Flashing simul- taneously	The reset of the device to the factory defaults is in progress.

Chapter 6. Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

Consult the troubleshooting guide in the manual.

Contact the manufacturer or packager of your system.

Contact the Woodward Full Service Distributor serving your area.

Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.

An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission. A **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at www.woodward.com/directory.

Product Service Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

Replacement/Exchange (24-hour service) Flat Rate Repair Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in "like-new" condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

For instructions about sending your MicroNet Plus Cyber Secure control to Woodward for repairs, please consult your product manual. It is suggested that you change the password of the Administrator account to the default value ("Admin@1") before sending it to Woodward. This will make it possible for Woodward to make appropriate changes to your control without removing your account configuration.

If you do not provide Administrator account credentials to Woodward for performing the work, Woodward will return the Password Manager configuration to the default configuration (see 3.1 Password Manager Configuration / Using Default Settings). It will be your responsibility to reconfigure the accounts to a secure and appropriate configuration.

When shipping the item(s), attach a tag with the following information: Return authorization number Name and location where the control is installed Name and phone number of contact person Complete Woodward part number(s) and serial number(s) Description of the problem Instructions describing the desired type of repair

Packing a Control

Use the following materials when returning a complete control: Protective caps on any connectors Antistatic protective bags on all electronic modules Packing materials that will not damage the surface of the unit At least 100 mm (4 inches) of tightly packed, industry-approved packing material A packing carton with double walls A strong tape around the outside of the carton for increased strength Released

Manual 35097-



To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

Replacement Parts

When ordering replacement parts for controls, include the following information: The part number(s) (XXXX-XXXX) that is on the enclosure nameplate The unit serial number, which is also on the nameplate

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website. Technical Support Product Training Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact us via telephone, email us, or use our website: <u>www.woodward.com</u>.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at <u>www.woodward.com/directory</u>, which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used in **Electrical Power Systems** Facility Phone Number Brazil +55 (19) 3708 4800 China +86 (512) 6762 6727 Germany: Kempen +49 (0) 21 52 14 51 +49 (711) 78954-Stuttgart 510 India +91 (124) 4399500 Japan +81 (43) 213-2191 +82 (51) 636-7080 Korea Poland +48 12 295 13 00 +1 (970) 482-United States 5811

Products Used in **Engine Systems** Facility Phone Number Brazil +55 (19) 3708 4800 China +86 (512) 6762 6727 Germany +49 (711) 78954-510 India +91 (124) 4399500 Japan +81 (43) 213-2191 Korea +82 (51) 636-7080 The Netherlands +31 (23) 5661111 United States +1 (970) 482-5811

Products Used in Industrial Turbomachinery Systems Facility Phone Number Brazil +55 (19) 3708 4800 China +86 (512) 6762 6727 India +91 (124) 4399500 Japan +81 (43) 213-2191 Korea +82 (51) 636-7080 The Netherlands +31 (23) 5661111 Poland +48 12 295 13 00 United States +1 (970) 482-5811



Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General		
Your Name		
Site Location		
Phone/Cell Number		
email (Fax Number)		
Appliance/Device Information		
Manufacturer		
S/N Serial Number		
MAC Address (if available)		
Firmware Version (if available)		
Application (power generation, marine, etc.)		
Status Information		
Control/Governor #1		
POWER (LED) Status		
MODE (LED) Status		
NET 1 (LED) Status		
NET 2 (LED) Status		
FAULT (LED) Status		
Order/Warranty Information		
Woodward Part Number		
Woodward Rev. Letter		
Symptoms	Cybersecurity Related \Box	H/W or S/W Related \Box
Description		

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

Glossary

Acronym/Term	Definition/Description
LAN	Local Area Network - The network behind the router (private/protected zone
	or access-controlled)
NAT	Network Address Translation - A routing method which modifies network
	address information of data packets to map one IP address space into
	another. IP masquerading is one application of NAT which helps to hide
	private networks behind a single public IP address.
Firmware	A binary computer program which provides the core security and device
	functionality used by higher-level software applications.
LSM	Loadable Software Module is licensed code which provides configurable
	functionality for the Tofino Xenon appliance.

Released

Revision History

New Manual - -

Released

We appreciate your comments about the content of our publications.

Send comments to: <u>icinfo@woodward.com</u> Please reference publication 35097-.





Email and Website-www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world. Complete address / phone / fax / email information for all locations is available on our website.