



NWC OT Cybersecurity JCBU L1 Devices Hardening Design

National Water Company (NWC), KSA
SCADA/OT Information Security Implementation Project

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REVISION HISTORY

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00	14 February 2022	AMS	RAS/SK	MM	

GLOSSARY

Acronyms	Meaning
ACL	Access Control Lists
AD	Active Directory
ADC	Additional Domain Controller
ATM	Advance System and Technology
ATP	Adaptive Threat Protection
BOM	Bill of Material
BU	Business Unit
BYOD	Bring Your Own Device
CAP	Client Authorization Policy
CAS	Central Administration Server
CIP	Critical Infrastructure Protection
CMC	Central Management Console (Nozomi)
CSMS	Cyber Security Management System
DCS	Distributed Control System
DLD	Detailed-Level Design
DMZ	Demilitarized Zone
DNS	Domain Name System
DNS	Domain Name System
ECC	Essential Cybersecurity Controls
ePO	ePolicy Orchestrator
EPP	End Point Protection
GPS	Global Positioning System
HCIS	High Commission for Industrial Security
HLD	High Level Design
HMI	Human Machine Interface
HSE	Health, Safety, And Environmental
ICS	Industrial Control System
IDS	Intrusion detection System
IPS	Intrusion Prevention System
ISA	International Society of Automation
ISO	International Organization for Standardization
IT	Information Technology
JCBU	Jeddah Central Business Unit
KSA	Kingdom of Saudi Arabia
MBSS	Minimum Baseline Security Standards
MCBU	Makkah Central Business Unit
MDCBU	Madinah Central Business Unit
MGMT	Management
NCA	National Cybersecurity Authority
NERC	North American Electric Reliability Corporation
NGFW	Next Generation Firewall

Acronyms	Meaning
NIST	U.S. National Institute of Standards and Technology
NTP	Network Time Protocol
NWC	National Water Company
OT	Operational Technology
PDC	Primary Domain Controller
PLC	Programmable Logic Controller
RAP	Resource Authorization Policy
RCBU	Riyadh Central Business Unit
RD	Remote Desktop
RDS	Remote Desktop Services
RTO	Recovery Time Objective
RPO	Recovery Point Objective
SCADA	Supervisory Control and Data Acquisition
SIEM	Security Incident & Event Management Solution
SSL	Secure Socket Layer
TCBU	Taif Central Business Unit
VLAN	Virtual Local Area Network
VM	Virtual Machine
VPN	Virtual Private Network

REFERENCE DOCUMENTS

S/N	Document No.	Title
1	A01001045-HLD-ARCH.00	NWC OT Cybersecurity HLD Reference Architecture
2	A01001045-HLD	NWC OT Cybersecurity High-Level Design
3	A01001045-INV.00	NWC SCADA/OT Asset Inventory
4	ECC – 1: 2018	KSA NCA Essential Cybersecurity Controls (ECC – 1: 2018)
5	ISA–62443-1-1 (99.01.01)–2007	Security for Industrial Automation and Control Systems Part 1-1: Terminology, Concepts, and Models

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1. DOCUMENT PURPOSE

The purpose of this document is to describe the Hardening Configuration of different L1 Devices in JCBU.

Following are list of L1 Devices installed at sites:

- Modicon Quantum & Premium
- Schneider M340
- Siemens S7-1200, 400 & 300
- Rockwell MicroLogix 1400
- Motorola ACE3600
- Siemens Scalene X-204
- ConneXium TCSESM

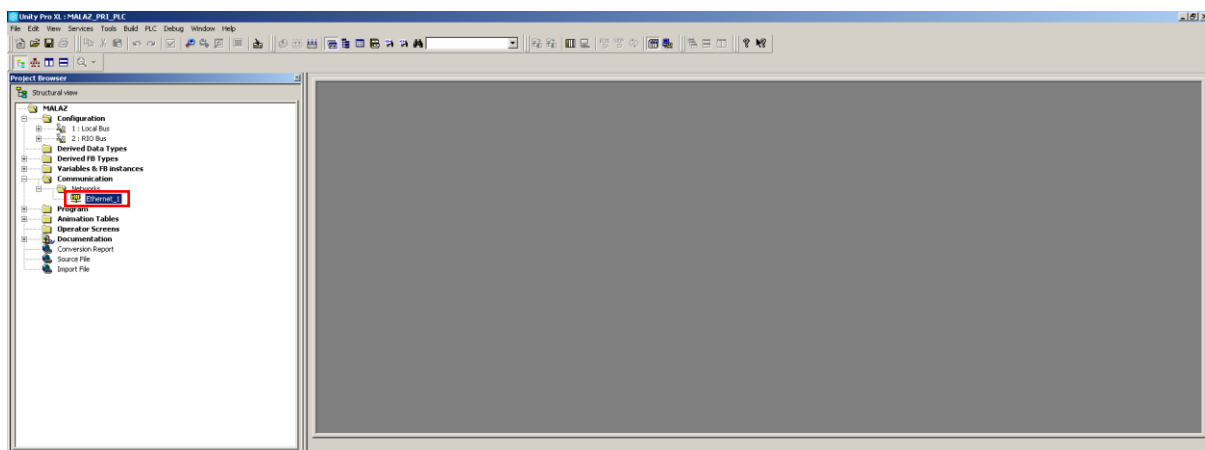
2. JCBU LEVEL 1 DEVICE HARDENING SETTINGS

2.1 MODICON QUANTUM & PREMIUM

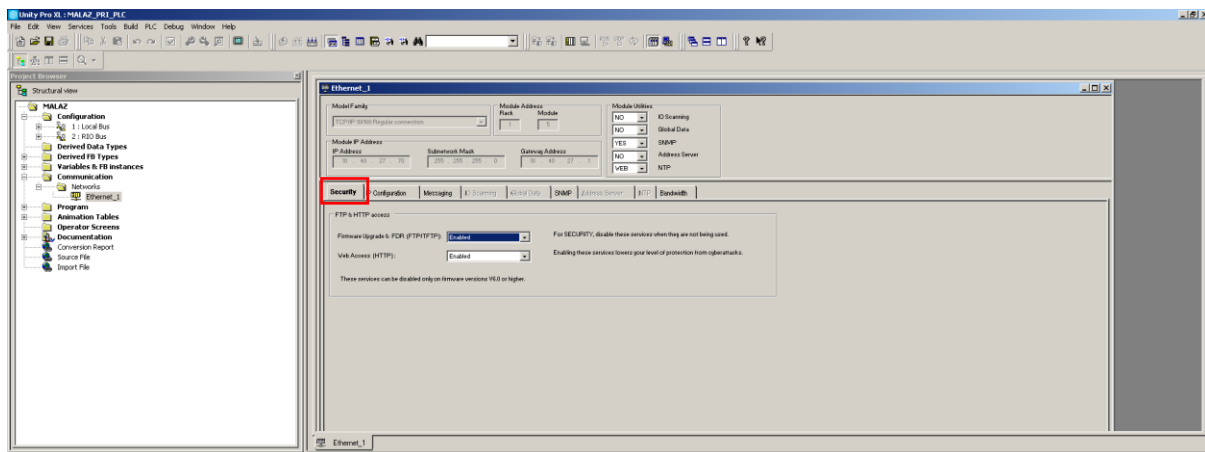
- Upgrade firmware
- Set password for security lock feature
- Disable HTTP/FTP ethernet services

Following is the procedure of how to disable HTTP/FTP services:

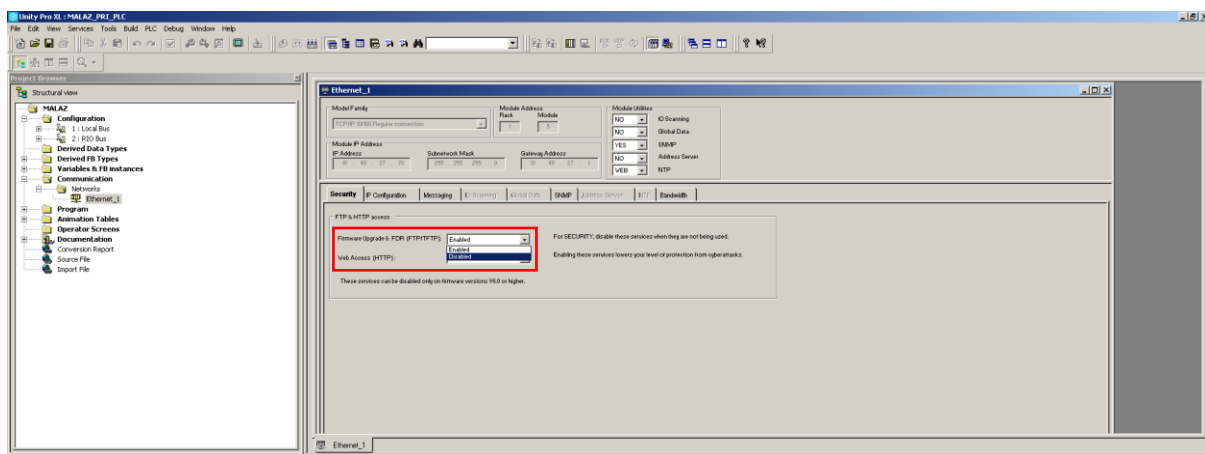
Step 1: Select Communication >> Networks >> Ethernet_1



Step 2: Select Security tab in Ethernet_1 window

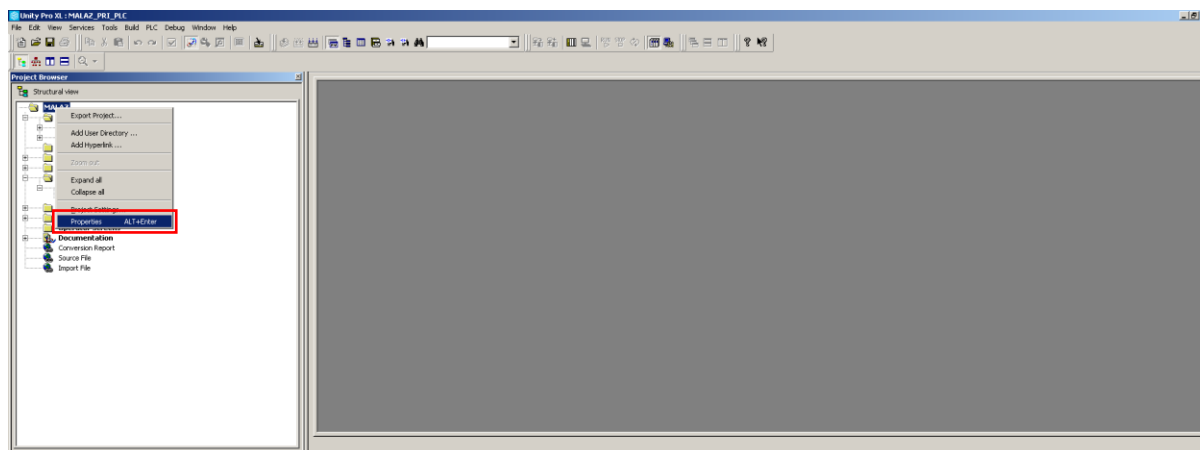


Step 3: In security tab, disable HTTP/FTP services

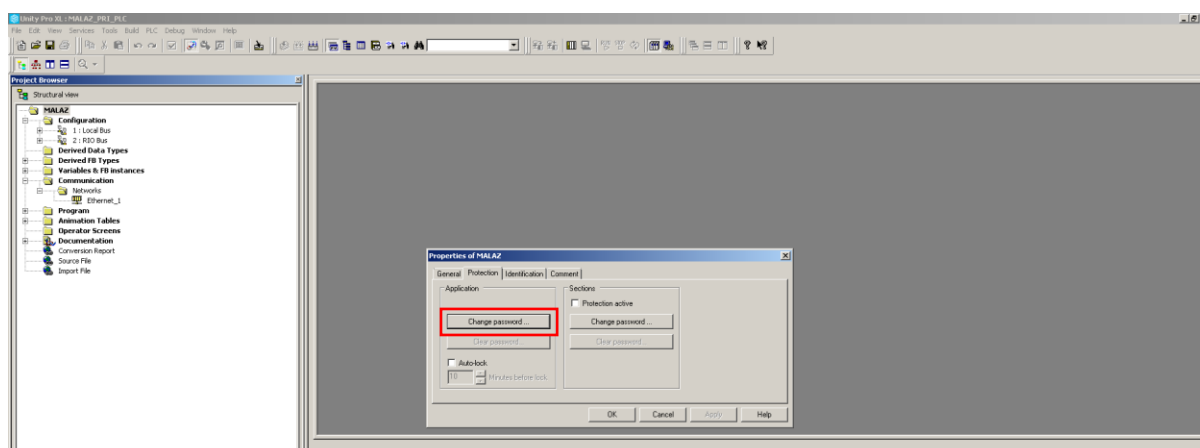


Following is the procedure to password protect the application:

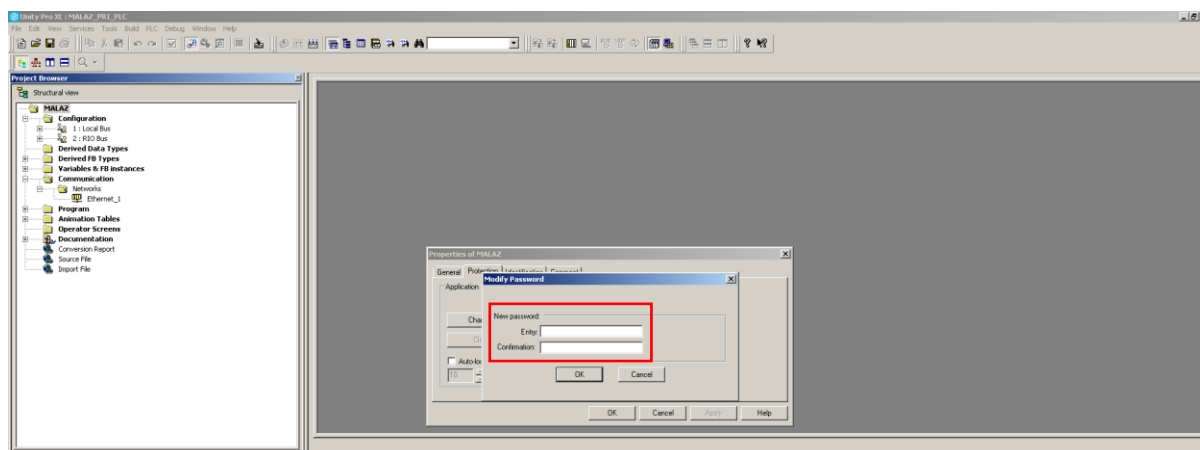
Step 1: Select the project and right click to select the properties



Step 2: Select "Protection" tab in properties, select change password



Step 3: Enter the new password and confirm it



For IP Setting:

Step 1: Go to Communication > Networks > Ethernet_1 and double click Ethernet_1

The screenshot shows the 'Ethernet_1' configuration window. The 'Model Family' is set to 'TCP/IP 10/100 Regular connection'. The 'Module Address' section has 'Rack', 'Module', and 'Channel' fields. The 'Module IP Address' section shows 'IP Address' as '0 . 0 . 0 . 0', 'Subnetwork Address' as '255 . 0 . 0 . 0', and 'Gateway Address' as '0 . 0 . 0 . 0'. The 'Module Utilities' section has dropdowns for 'IO Scanning' (NO), 'Global Data' (NO), 'SNMP' (YES), 'Address Server' (NO), and 'NTP' (WEB). The 'Messaging' tab is selected, showing a 'Connection configuration' section with a table of 'Access' and 'IP address' entries. The 'Access Control' checkbox is unchecked.

	Access	IP address
1	<input checked="" type="checkbox"/>	
2	<input checked="" type="checkbox"/>	
3	<input checked="" type="checkbox"/>	
4	<input checked="" type="checkbox"/>	
5	<input checked="" type="checkbox"/>	
6	<input checked="" type="checkbox"/>	
7	<input checked="" type="checkbox"/>	
8	<input checked="" type="checkbox"/>	
9	<input checked="" type="checkbox"/>	
10	<input checked="" type="checkbox"/>	
11	<input checked="" type="checkbox"/>	
12	<input checked="" type="checkbox"/>	

Step 2: Select the IP Configuration tab and change the IP settings

The screenshot shows the 'Ethernet_1' configuration window with the 'IP Configuration' tab selected. The 'Model Family' is 'TCP/IP 10/100 Regular connection'. The 'Module Address' section has 'Rack', 'Module', and 'Channel' fields. The 'Module IP Address' section shows 'IP Address' as '13 . 12 . 10 . 14', 'Subnetwork Address' as '25 . 25 . 0 . 0', and 'Gateway Address' as '13 . 12 . 10 . 1'. The 'Module Utilities' section has dropdowns for 'IO Scanning' (NO), 'Global Data' (NO), 'SNMP' (YES), 'Address Server' (NO), and 'NTP' (WEB). The 'IP address configuration' section has radio buttons for 'Configured' (selected) and 'From a server'. The 'Configured' section shows 'IP address' as '13 . 12 . 10 . 14', 'Subnetwork mask' as '25 . 25 . 0 . 0', and 'Gateway address' as '13 . 12 . 10 . 1'. The 'Ethernet configuration' section has radio buttons for 'Ethernet II' (selected) and '802.3'.

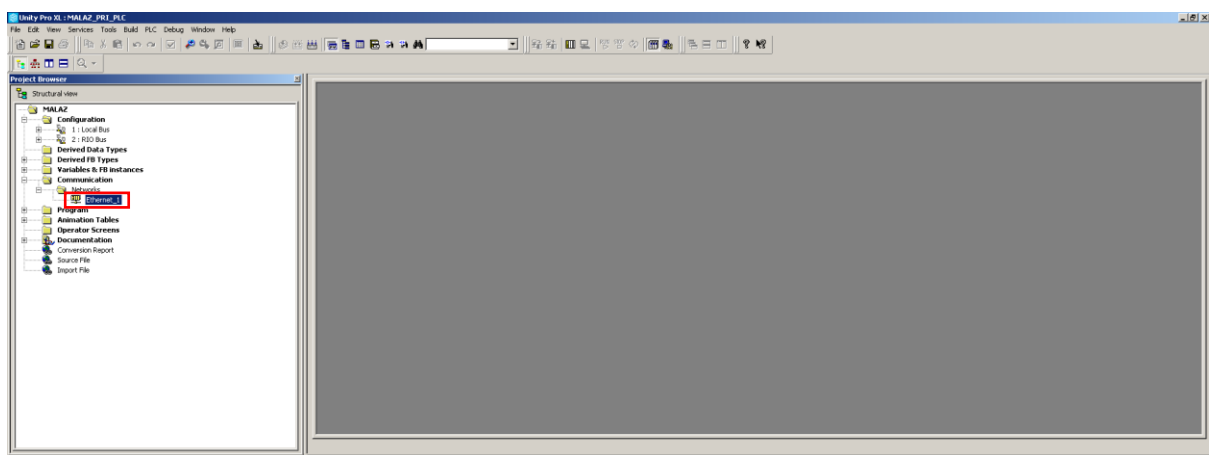
For firmware upgrade, see “Attachment 5-Section 2.1 - Modicon Quantum_Firmware Upgrade Process”

2.2 SCHNEIDER M340

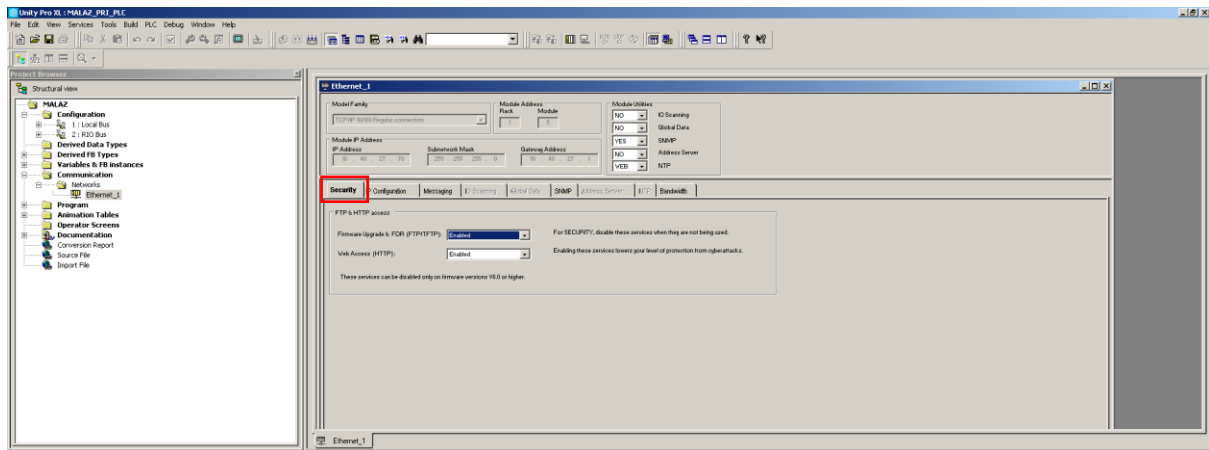
- Upgrade firmware
- Set password for security lock feature
- Disable HTTP/FTP ethernet services

Following is the procedure of how to disable HTTP/FTP services:

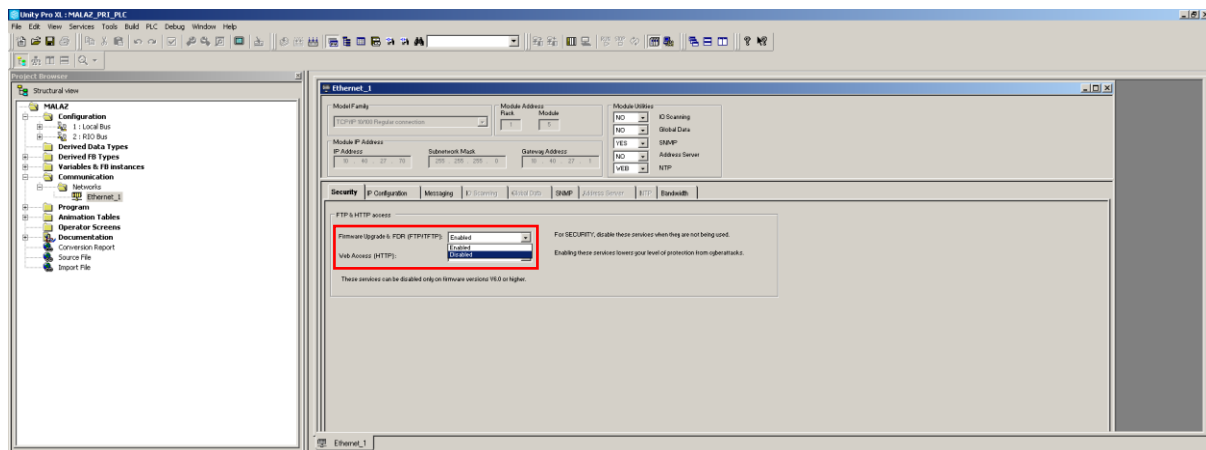
Step 1: Select Communication >> Networks >> Ethernet_1



Step 2: Select Security tab in Ethernet_1 window



Step 3: In security tab, disable HTTP/FTP services

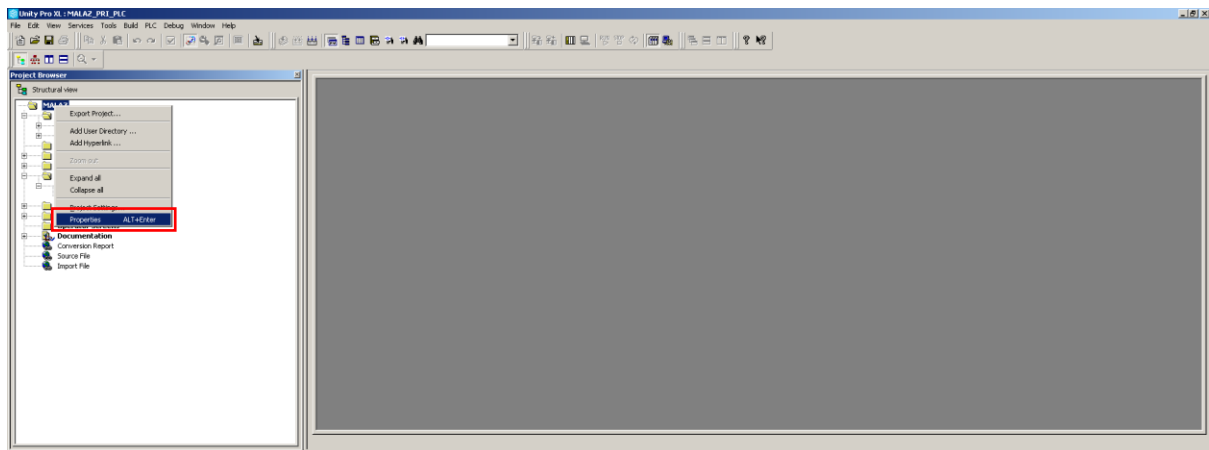


For IP Setting, see “Attachment 3-Section 2.2 - Schneider M340_Modicon Setting the IP Address”

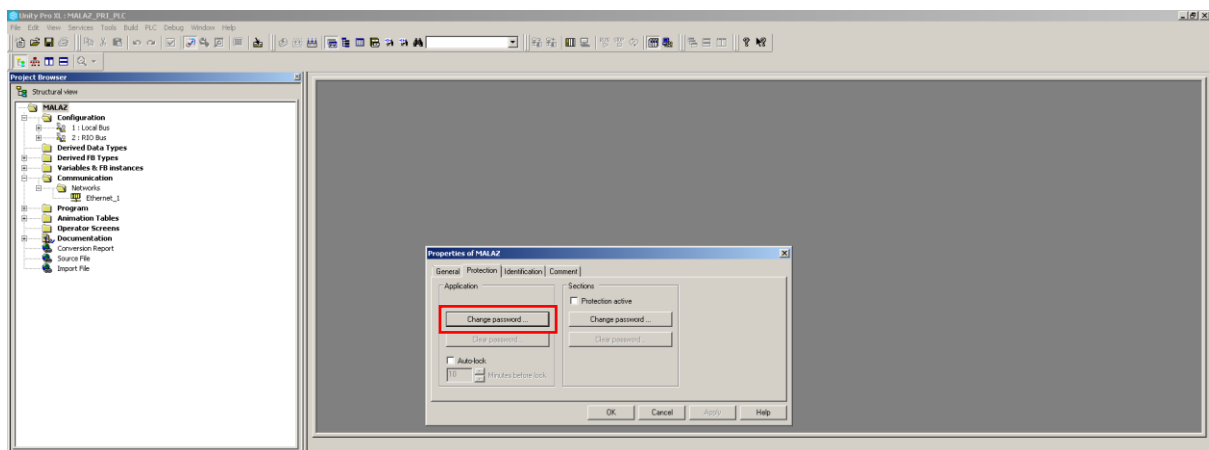
For firmware upgrade, see “Attachment 4-Section 2.2 - Schneider M340_Firmware Upgrade Process”

Following is the procedure to password protect the application:

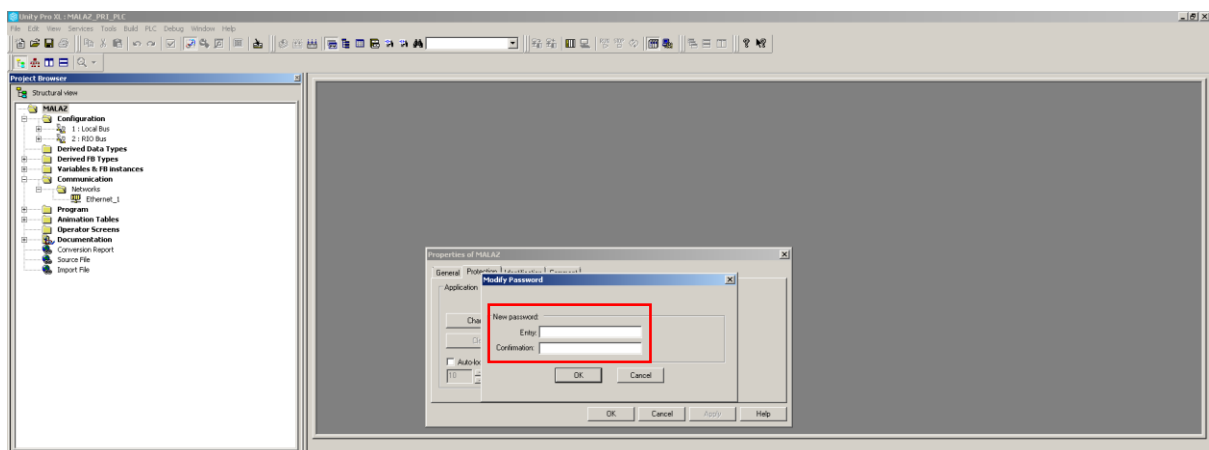
Step 1: Select the project and right click to select the properties



Step 2: Select "Protection" tab in properties, select change password



Step 3: Enter the new password and confirm it



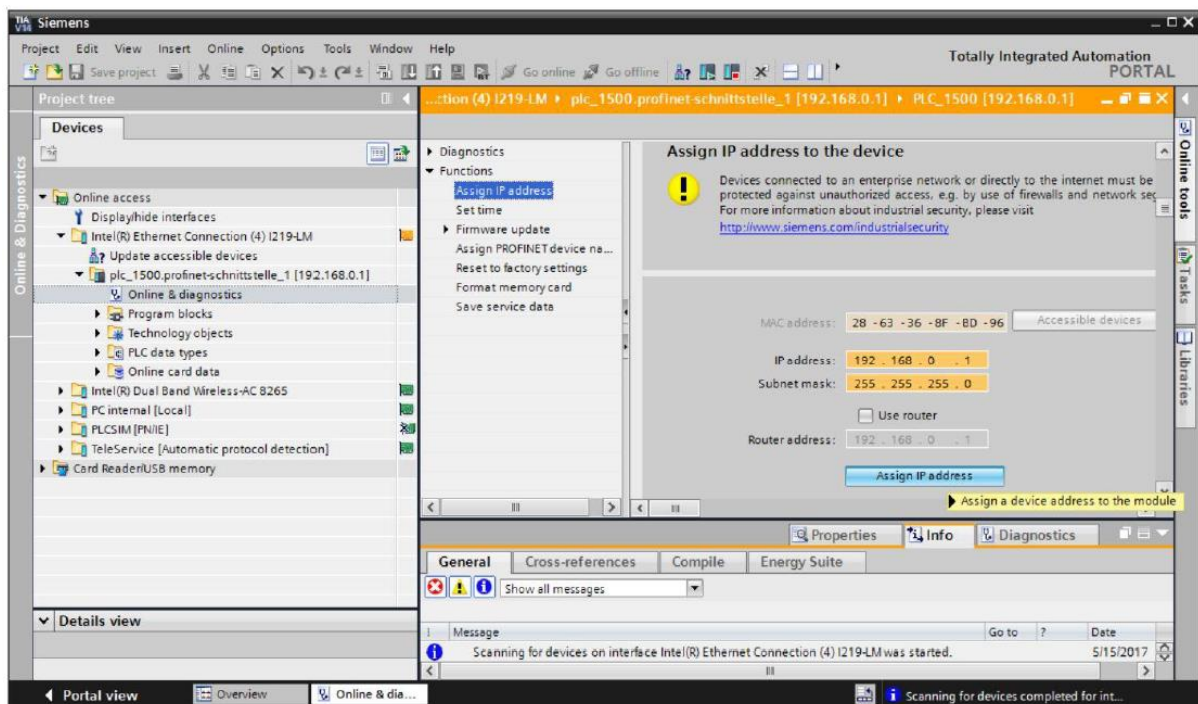
2.3 SIEMENS S7-1200, S7-400 & S7-300

- Upgrade firmware
- Set password for security lock feature
- Disable HTTP/FTP ethernet services

For IP Setting:

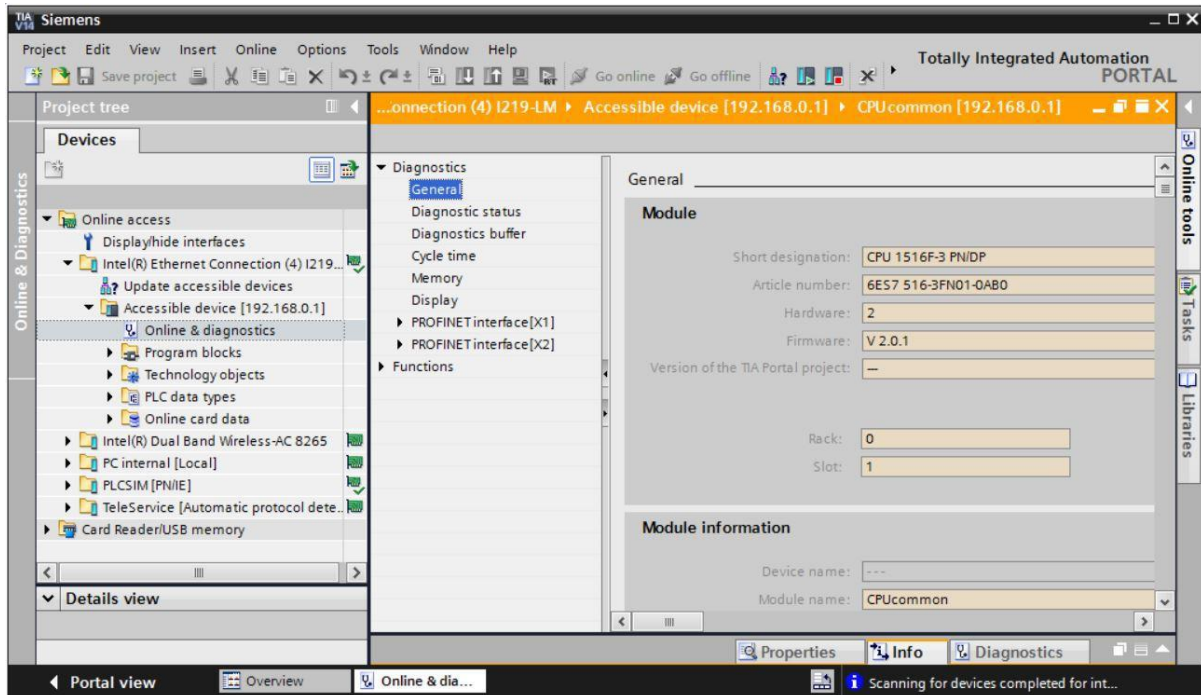
Step 1: Go to "Online & Diagnostics"

Step 2: Under "Functions", you now find the "Assign IP address" item. Enter the following IP address here (example): IP address: 192.168.0.1 Subnet mask 255.255.255.0. Next, click "Assign IP address" and this new address will be assigned.

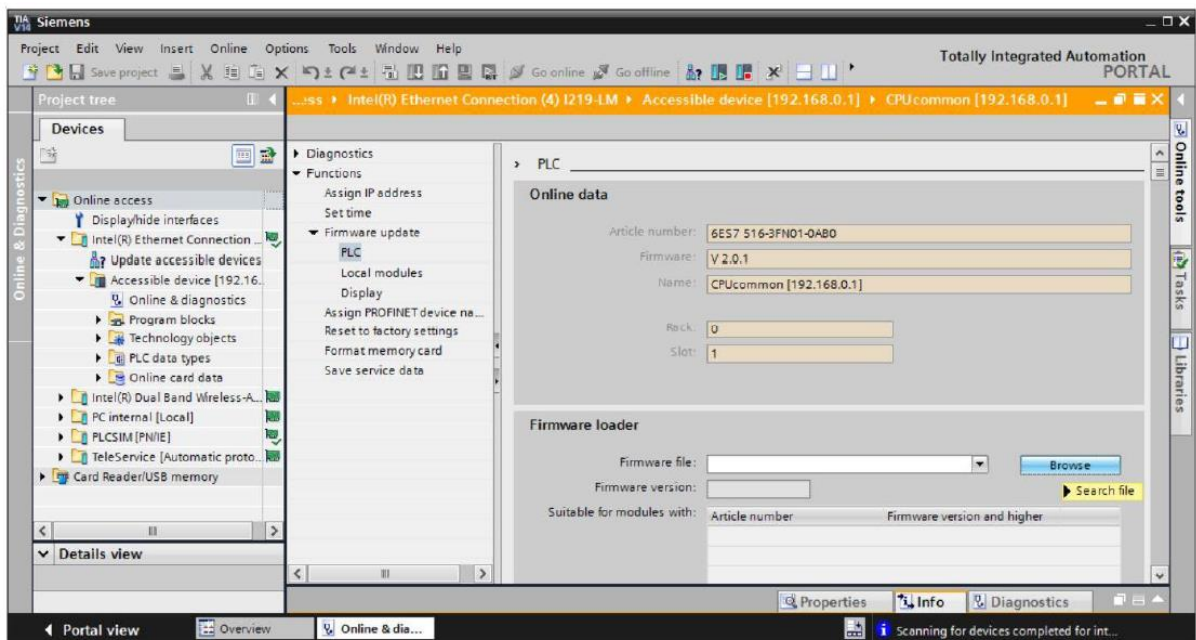


For firmware upgrade:

Step 1:

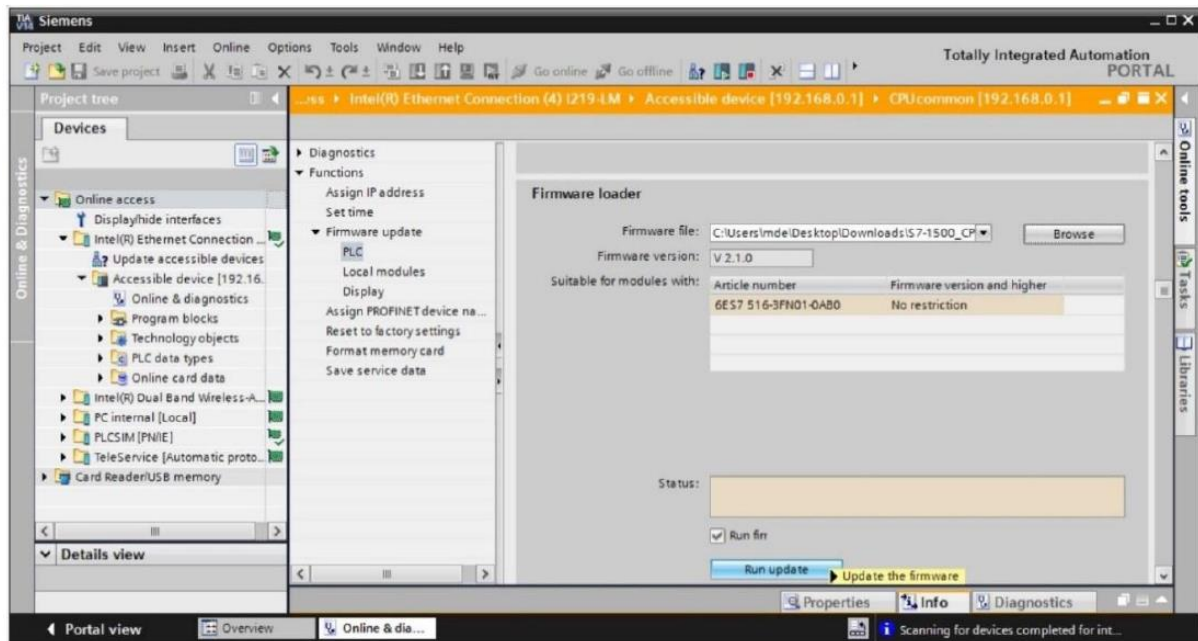


Step 2: In the "Functions" menu, change to "Firmware update" > "PLC". In the "Firmware loader" sub-item, click "Browse".

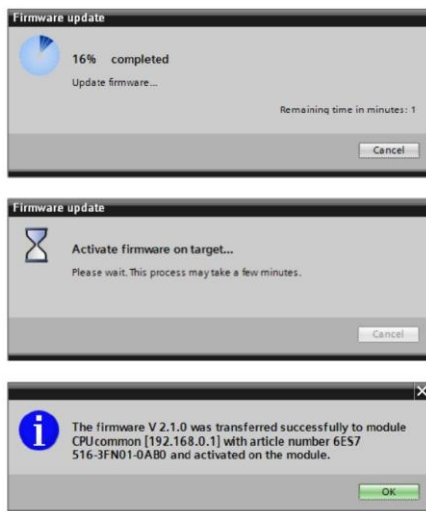


Step 3: Select the downloaded and extracted firmware file.

Step 4: The following dialog indicates whether your firmware file is compatible with your CPU. Now start the update. ("Run update")



Step 5: The progress of the update and its successful completion are indicated with the following dialogs. Click "OK" to confirm.



2.4 ROCKWELL MICROLOGIX 1400

- Upgrade firmware
- Set password for security lock feature
- Disable HTTP/FTP ethernet services

For IP Setting:

Step 1: Using RS Logix 500, go to Channel configuration, Channel 1, uncheck the BootP/DHCP tick box, edit the IP and subnet mask fields (gateway too if necessary), then apply the changes.

Step 2: Power cycle the PLC.

For firmware upgrade, refer to the "MicroLogix 1400 Firmware Upgrade" document.

2.5 MOTOROLA ACE3600

- Upgrade firmware
- Set password for security lock feature
- Disable HTTP/FTP ethernet services

For IP Change refer to the “Attachment 1-Motorola ACE3600 IP Config”.

For Firmware Upgrade refer to “Attachment 2-Motorola ACE3600 Firmware Upgrade”.

2.6 T-BOX MS

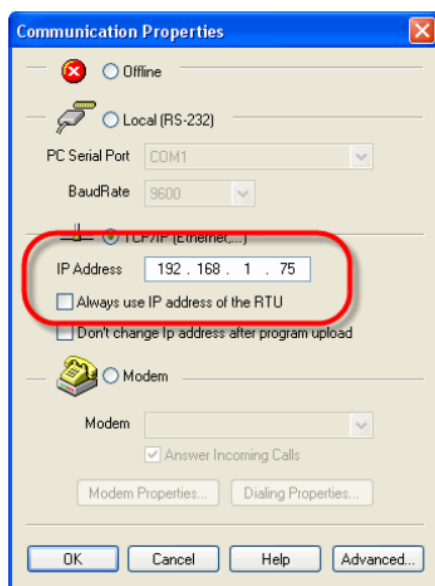
- Upgrade firmware
- Set password for security lock feature
- Disable HTTP/FTP ethernet services

For IP Configuration:

Step 1: Uncheck the “Always use IP address of the RTU” option

Step 2: Uncheck the “Don’t Change IP address after program upload” option

Step 3: Enter the desired IP address

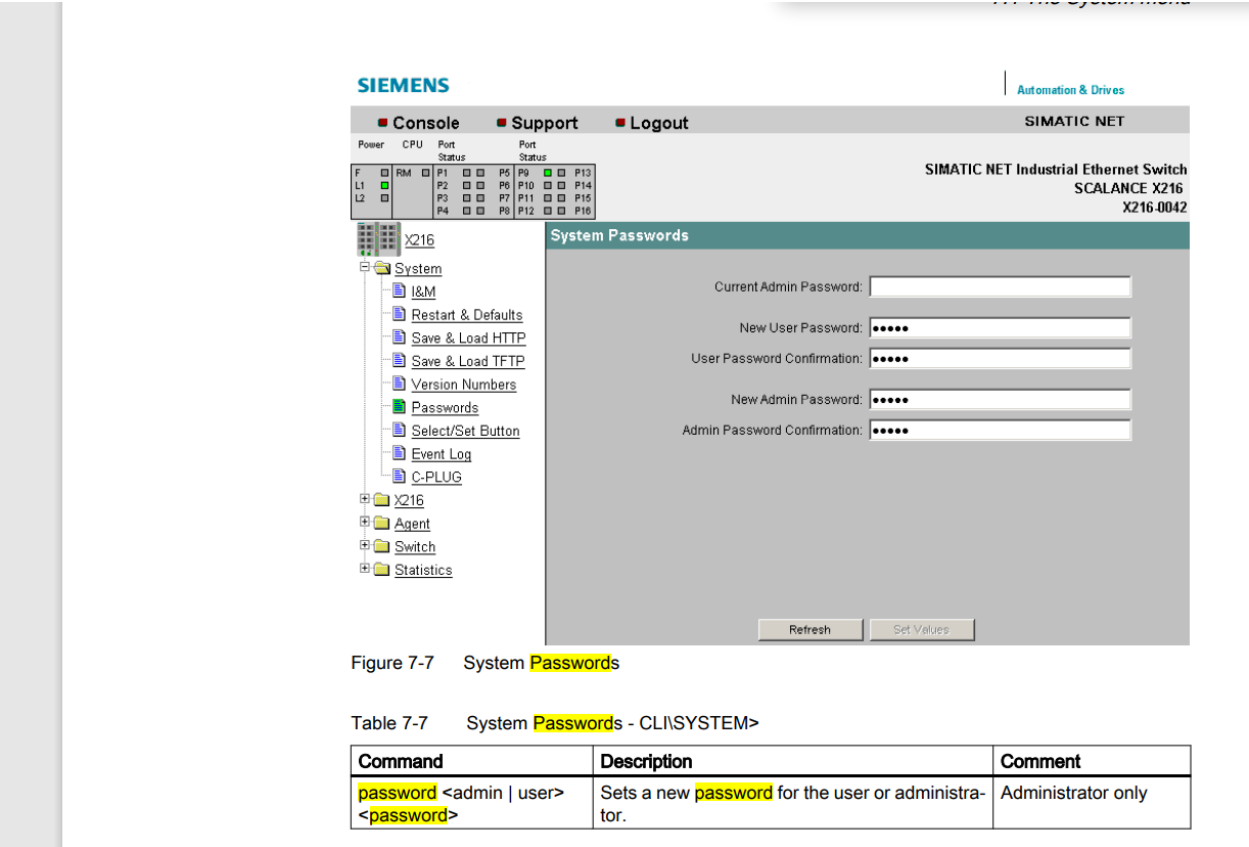


Step 4: Click “OK” and upload the program

2.7 SEIMENS SCALANCE-X-204

- Default username and password should be changed

Note Default password when supplied • For Admin: admin • For the user: user.



- Unused Port should be block for Managed switch
- IP http/telnet/ftp should be disable only HTTPs/ssh/sftp should used
- Serial Access should be password Protected
- Should configure the Login Banner
- Firmware needs to be upgraded from vendor release

2.8 CONNEXIUM TCSESM, TCSESM-E MANAGED SWITCH

- Default username and password should be changed

Figure 3: Logging in to the Command Line Interface program

- ☐ Enter a user name. The default setting for the user name is **admin**. Press the Enter key.
 - ☐ Enter the password. The default setting for the password is **private**. Press the Enter key.
- You can change the user name and the password later in the Command Line Interface.
- Please note that these entries are case-sensitive.

The start screen appears.

Note: For a TCSESM Switch, the preset CLI prompt is (Schneider Electric TCSESM) >, for a TCSESM-E Switch it is (Schneider Electric TCSESM-E) >.

- Unused Port should be block for Managed switch

■ Switching the port on and off

In the state on delivery, all the ports are switched on. For a higher level of access security, switch off the ports at which you are not making any connection.

- ☐ Select the Basics:Port Configuration dialog.
- ☐ In the "Port on" column, select the ports that are connected to another device.

■ Selecting the operating mode

In the state on delivery, all the ports are set to the "Automatic configuration" operating mode.

Note: The active automatic configuration has priority over the manual configuration.

- ☐ Select the Basics:Port Configuration dialog.
- ☐ If the device connected to this port requires a fixed setting
 - select the operating mode (transmission rate, duplex mode) in the "Manual configuration" column and
 - deactivate the port in the "Automatic configuration" column.

- IP http/telnet should be disable only HTTPs/ssh should be used for access

```
enable
configure
```

Switch to the privileged EXEC mode.
Switch to the Configuration mode.

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Assistance in the Protection from Un-authorized Access

6.3 Telnet/Web/SSH access

```
lineconfig
transport input telnet
no transport input telnet
exit
exit
ip http server
no ip http server
```

Switch to the configuration mode for CLI.
Enable Telnet server.
Disable Telnet server.
Switch to the Configuration mode.
Switch to the privileged EXEC mode.
Enable Web server.
Disable Web server.

- Serial Access should be password Protected
- Should configure the Login Banner
- Firmware needs to be upgraded from vendor release



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