

## INSTALLATION AND OPERATION MANUAL

# CNFE3DOE2/M

## RS232/422/485 DATA OVER ETHERNET TERMINAL SERVER

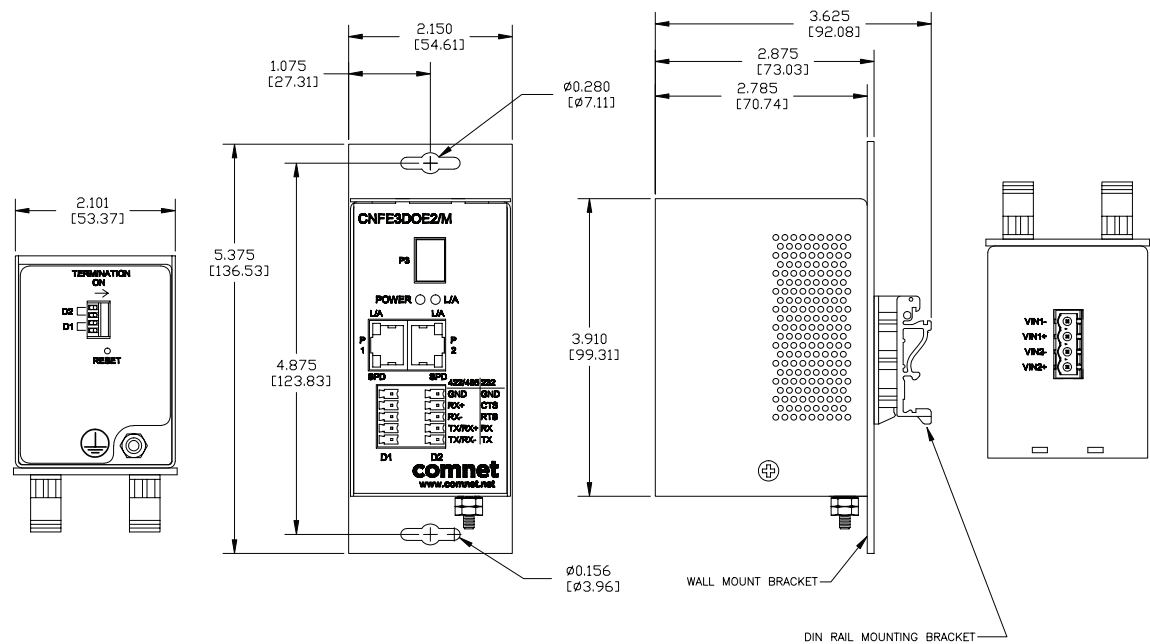
The ComNet CNFE3DOE2/M allows any combination of two RS-232, RS-422, or 2 or 4-wire RS-485 serial data circuits to be inserted onto any 10/100 Mbps Ethernet-based network. The CNFE3DOE2/M units include two serial data input/output ports, and three Ethernet ports featuring two electrical ports and one SFP port. It may be used to tunnel serial data over an IP network or as a media converter, for converting copper transmission media to fiber. Access one serial device from the Internet and another serial device from a local area network (LAN) using SSH or SSL. The CNFE3DOE2/M provides control of the remote hardware, as if it were connected directly to the PC COM port. A USB to serial converter may be required in new PCs without a DB9 serial connection. The CNFE3DOE2/M supports SNMP Version 1, RFC1155, RFC1213 & RFC1215.

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# Hardware description

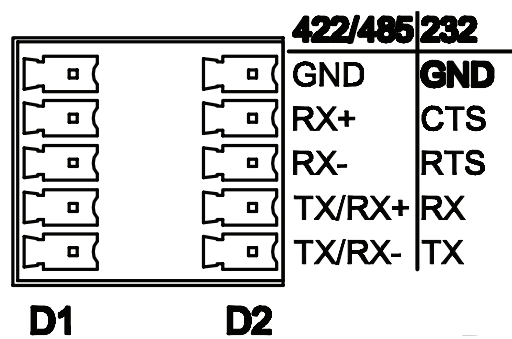
The ComNet CNFE3DOE2/M terminal server supports Ethernet transmission over two copper ports and one fiber port. The server is universally compatible with RS232, RS422, RS485 serial data protocols. All configurations are done through its web server. Distances depend on which SFP (Small Form Pluggable) module is used. The RJ45 Ethernet and SFP interfaces are all enabled. They can function as an Ethernet media converter.



Mechanical Drawing of CNFE3DOE2/M Unit

Switches are used for RS485 Full Duplex mode to terminate Tx+ & Tx- and Rx+ & Rx- with 120 ohms. Both switches should be in the on position. For all other modes, the switches should be in the off position.

The data connector pin-out is as below:



Settings by Data Type (Port 1 or 2)

## Assign IP Address to a Terminal Server

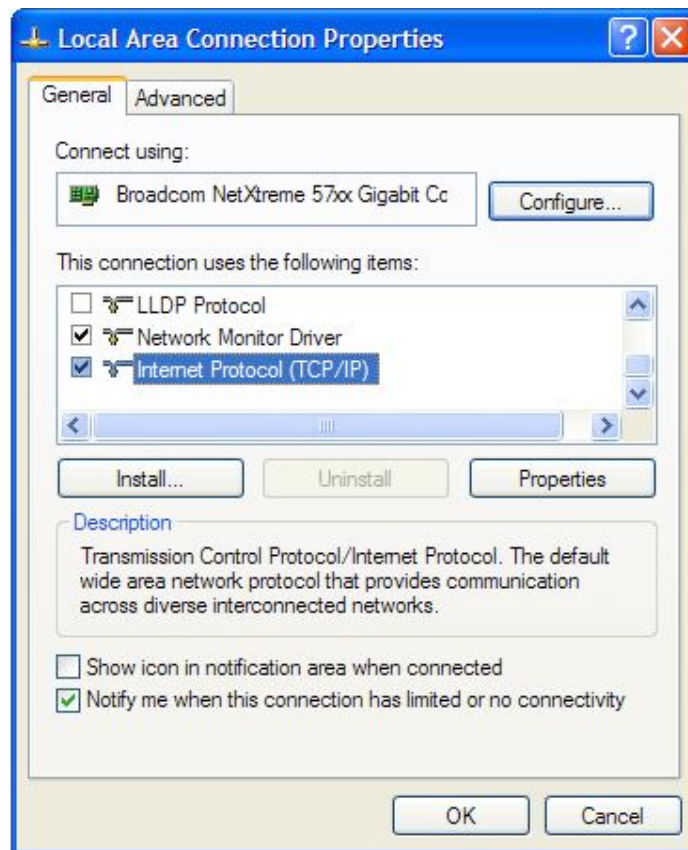
A unique IP address has to be assigned to each terminal server device. You can connect one at a time to change the default IP address. The default IP address of the device is the same: 192.168.10.1.

Connect the terminal server on to your local Ethernet network which your PC is connected to, and power on the unit.

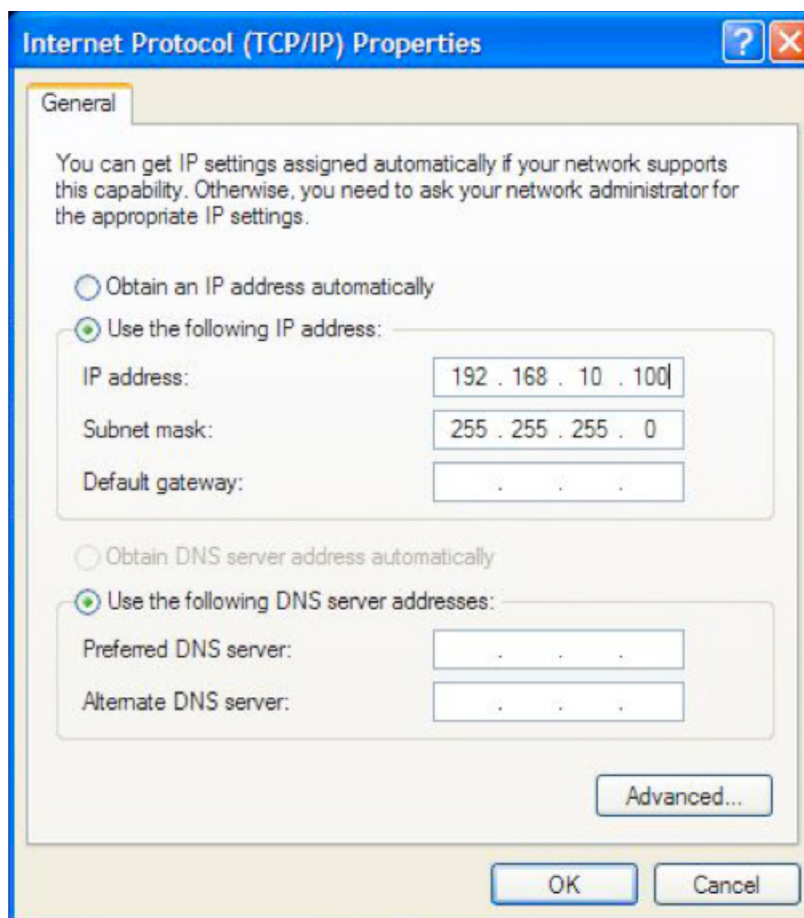
Follow the steps below to set up your PC IP address to the same subnet as the terminal servers.

Disable the machine's wireless network connection and any other internet connections that could interfere with the network being created.

Select the Internet Protocol (TCP/IP) connection within the Local Area Connection Properties from **start -> Control Panel -> Network Connections -> Properties**.



Next, manually set your IP address to **192.168.10.100**, for instance, and your subnet mask to **255.255.255.0**, as shown below.



Click **OK** to finish the setting.

Open the browser on your PC, and type in **192.168.10.1** and open the Terminal Server Log in Page as shown.

The default User Name and Password are both **admin**

Log in to the Terminal Server Home Page as shown.

The image shows a web browser's security warning dialog box. At the top, it says "Authentication required". Below that, it shows the URL "http://192.168.10.1" and a warning: "Your connection to this site is not private". There are two input fields: "Username" with the text "admin" and "Password" with six dots. At the bottom, there are two buttons: "Log in" (highlighted in blue) and "Cancel".

*Terminal Server Log in Pop-up*

The screenshot displays the 'Comnet Terminal server' configuration interface. On the left is a sidebar with navigation links: Network, NetworkStats, TCP, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The main content area is titled 'Comnet Terminal server' and contains a 'Network' configuration section. This section includes fields for Protocol (set to TCP/SSL), Device Name (SB70LCSX-6B54), NetBIOS Name (SB70LCSX-6B54), MAC Address (00:03:F4:0A:6B:54), NB Version (02.07.0000), and Comnet Version (2.0.0). Below these are three columns: 'Static Settings' with fields for Device IP Address (192.168.10.1), Device Subnet Mask (255.255.255.0), Device Gateway (0.0.0.0), and DNS Server (0.0.0.0); 'DHCP Assigned Values' with an NTP Server field (pool.ntp.org) and a value of 0.0.0.0; and 'Address Mode' with a dropdown set to 'Static IP' and a note 'No network gateway to get time'. A 'System Time' field shows 'No valid time UTC (When page was loaded)'. At the bottom are 'Reset To Factory Defaults' and 'Submit New Settings' buttons.

Figure 1 Terminal Server Network Page

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*Terminal Server Network Page*

Click on the **Device IP Address** text box.

Change the IP address to an IP address with subnet appropriate for your network. In the following examples an IP address in subnet **192.168.10.xxx** will be used.

Configure the IP address to **192.168.10.10** as shown in the Terminal Server Network Page.

Click **Submit New Settings**.

TCP	D1	D2
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Listening network port:	<input type="text" value="23"/>	<input type="text" value="24"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
Allow new connection if the existing connection has been idle for this many seconds.	<input type="text" value="30"/>	<input type="text" value="30"/>
<b>When to begin making outgoing tcp connections:</b>	<input type="text" value="Never"/>	<input type="text" value="Never"/>
Connect on network port:	<input type="text" value="1000"/>	<input type="text" value="1000"/>
Connect to this address:	<input type="text" value="(Enter IP Address)"/>	<input type="text" value="(Enter IP Address)"/>
Alternate address:	<input type="text" value="(Enter IP Address)"/>	<input type="text" value="(Enter IP Address)"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
Retry failed outgoing connections after this many seconds.	<input type="text" value="360"/>	<input type="text" value="360"/>
Check and maintain valid connection at intervals in seconds.	<input type="text" value="0"/>	<input type="text" value="0"/>
<b>Use custom packetization logic (below)</b>	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending TCP packet:	<input type="text" value="32"/>	<input type="text" value="32"/>
Number of msec to wait for accumulated characters: 0 waits forever.	<input type="text" value="100"/>	<input type="text" value="100"/>
Flush TCP frame when this character is received (Enter NA to disable):	<input type="text" value="NA"/>	<input type="text" value="NA"/>
USE SSL rather than TCP for connections:	<input type="checkbox"/>	<input type="checkbox"/>
Always Save Serial Chars regardless of connection status:	<input type="checkbox"/>	<input type="checkbox"/>
<b>Network Settings on Serial Port - Advanced Serial Settings</b>		
<input type="button" value="Submit New Settings"/>		

Figure 2 Terminal Server TCP Page

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Terminal Server Configuration Page

Log in to the terminal server again using the new IP address.

If an IP address in a different subnet was used, be sure to change the PC's network address to an IP address in the appropriate subnet.

# Using Terminal Server as a Serial Extender over Ethernet

## TCP Transport

To use the Terminal Server as a serial extender over Ethernet, connect two terminal servers to your local Ethernet network.

### Configure Server

Configure the first device as a server:

- » Set protocol to TCP/SSL on Network page.

**comnet**

Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol:  (Changing will terminate all existing connections)

Device Name (for DHCP):

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

Static Settings	DHCP Assigned Values	Address Mode
Device IP Address: <input type="text" value="192.168.10.1"/>		<input type="text" value="Static IP"/>
Device Subnet Mask: <input type="text" value="255.255.255.0"/>		
Device Gateway: <input type="text" value="0.0.0.0"/>		
DNS Server: <input type="text" value="0.0.0.0"/>		
NTP Server: <input type="text" value="pool.ntp.org"/>	0.0.0.0	No network gateway to get time
System Time: No valid time UTC (When page was loaded)		


Figure 1 Terminal Server Network Page

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Figure 1 Terminal Server Network Page

- » Click TCP link
- » Configure Port1 to listen for incoming connections on port 24




Comnet Terminal Server

Network	TCP	D1	D2
<b>NetworkStats</b>	<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>TCP</b>	Listening network port:	<input type="text" value="23"/>	<input type="text" value="24"/>
<b>Serial</b>	Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
<b>Password</b>	Allow new connection if the existing connection has been idle for this many seconds.	<input type="text" value="30"/>	<input type="text" value="30"/>
<b>HTTPS</b>	<b>When to begin making outgoing tcp connections:</b>	<input type="text" value="Never"/>	<input type="text" value="Never"/>
<b>CAcerts</b>	Connect on network port:	<input type="text" value="1000"/>	<input type="text" value="1000"/>
<b>Advanced</b>	Connect to this address:	<input type="text" value="(Enter IP Address)"/>	<input type="text" value="(Enter IP Address)"/>
<b>Help</b>	Alternate address:	<input type="text" value="(Enter IP Address)"/>	<input type="text" value="(Enter IP Address)"/>
	Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
	Retry failed outgoing connections after this many seconds.	<input type="text" value="360"/>	<input type="text" value="360"/>
	Check and maintain valid connection at intervals in seconds.	<input type="text" value="0"/>	<input type="text" value="0"/>
	<b>Use custom packetization logic (below)</b>	<input type="checkbox"/>	<input type="checkbox"/>
	Number of characters to accumulate before sending TCP packet:	<input type="text" value="32"/>	<input type="text" value="32"/>
	Number of msec to wait for accumulated characters: 0 waits forever.	<input type="text" value="100"/>	<input type="text" value="100"/>
	Flush TCP frame when this character is received (Enter NA to disable):	<input type="text" value="NA"/>	<input type="text" value="NA"/>
	USE SSL rather than TCP for connections:	<input type="checkbox"/>	<input type="checkbox"/>
	Always Save Serial Chars regardless of connection status:	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Network Settings on Serial Port -</b> <a href="#">Advanced Serial Settings</a>		
	<input type="button" value="Submit New Settings"/>		

Figure 2 Terminal Server TCP Page

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Figure 2 Terminal Server TCP Page

- » Click Serial link
- » Configure Port1 for RS422

**comnet** Comnet Terminal Server

**Serial**

	D1	D2
Data Port Settings:	DEBUG	RS-422
Data Baud Rate:	115200	115200
Custom Baud Rate:	0	0
Data Bits:	8	8
Data Parity:	None	None
Stop Bits:	1	1
Flow Control:	None	None
AT Commands:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Submit New Settings

Figure 3 Terminal Server Serial Page

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Figure 3 Terminal Server Serial Page

## Configure Client

- » Configure the second device as a client.
- » Set protocol to TCP/SSL on Network page.

**comnet** Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol: TCP/SSL (Changing will terminate all existing connections)

Device Name (for DHCP): SB70LCSX-6B54

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

Static Settings	DHCP Assigned Values	Address Mode
Device IP Address: 192.168.10.2		Static IP
Device Subnet Mask: 255.255.255.0		
Device Gateway: 0.0.0.0		
DNS Server: 0.0.0.0		
NTP Server: pool.ntp.org	0.0.0.0	No network gateway to get time
System Time: No valid time UTC (When page was loaded)		

Reset To Factory Defaults Submit New Settings

Figure 4 Terminal Client Network Page

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Figure 4 Terminal Client Network Page

- » Click TCP link
- » Configure Port1 to connect to 192.168.10.1 port 24

	D1	D2
<b>TCP</b>		
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input type="checkbox"/>
Listening network port:	23	24
Timeout and disconnect after this many seconds of inactivity.	60	60
Allow new connection if the existing connection has been idle for this many seconds.	30	30
<b>When to begin making outgoing tcp connections:</b>	Never	If serial data received
Connect on network port:		24
Connect to this address:	(Enter IP Address)	192.168.10.1
Alternate address:	(Enter IP Address)	(Enter IP Address)
Timeout and disconnect after this many seconds of inactivity.	60	60
Retry failed outgoing connections after this many seconds.	360	360
Check and maintain valid connection at intervals in seconds.	0	0
<b>Use custom packetization logic (below)</b>	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending TCP packet:	32	32
Number of msec to wait for accumulated characters: 0 waits forever.	100	100
Flush TCP frame when this character is received (Enter NA to disable):	NA	NA
USE SSL rather than TCP for connections:	<input type="checkbox"/>	<input type="checkbox"/>
Always Save Serial Chars regardless of connection status:	<input type="checkbox"/>	<input type="checkbox"/>
<b>Network Settings on Serial Port - Advanced Serial Settings</b>		
<input type="button" value="Submit New Settings"/>		

Figure 5 Terminal Client TCP Page

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Figure 5 Terminal Client TCP Page

- » Click Serial link
- » Configure Port1 for RS422

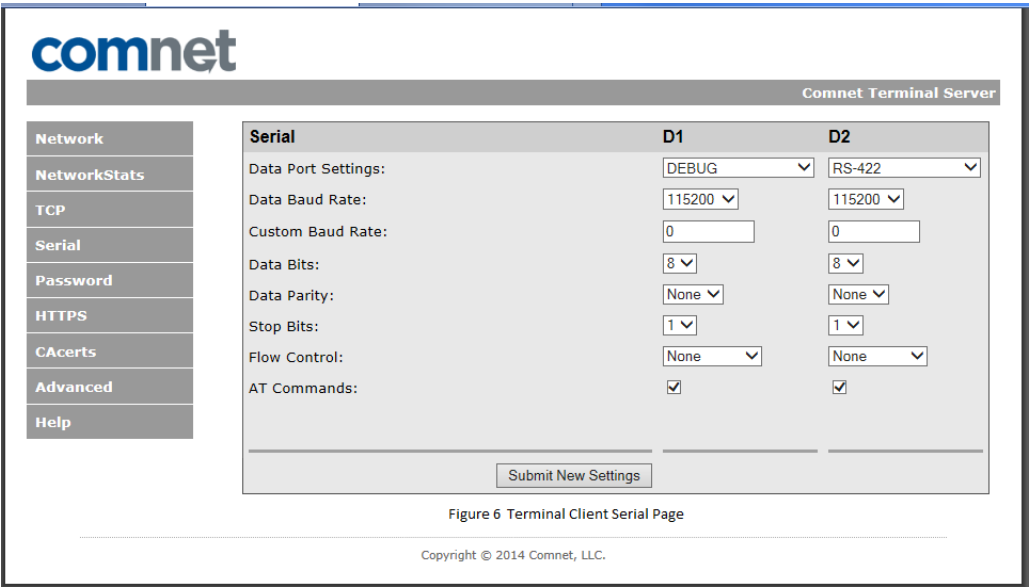


Figure 6 Terminal Client Serial Page

## UDP Transport

To use the Terminal Server as a serial extender over Ethernet utilizing UDP, connect two terminal servers to your local Ethernet network and configure devices as a client server connection.

### Configure Server

» Set protocol to UDP on Network page.

**comnet** Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol:  (Changing will terminate all existing connections)

Device Name (for DHCP):

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

**Static Settings**

Device IP Address:

Device Subnet Mask:

Device Gateway:

DNS Server:

NTP Server:

System Time: No valid time UTC (When page was loaded)

**DHCP Assigned Values**

**Address Mode**

Figure 7 Terminal Server Network Page

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Figure 7 Terminal Server Network Page

- » Click UDP link
- » Configure Port1 to receive on port 24 & to transmit to 192.168.10.2 on port 25

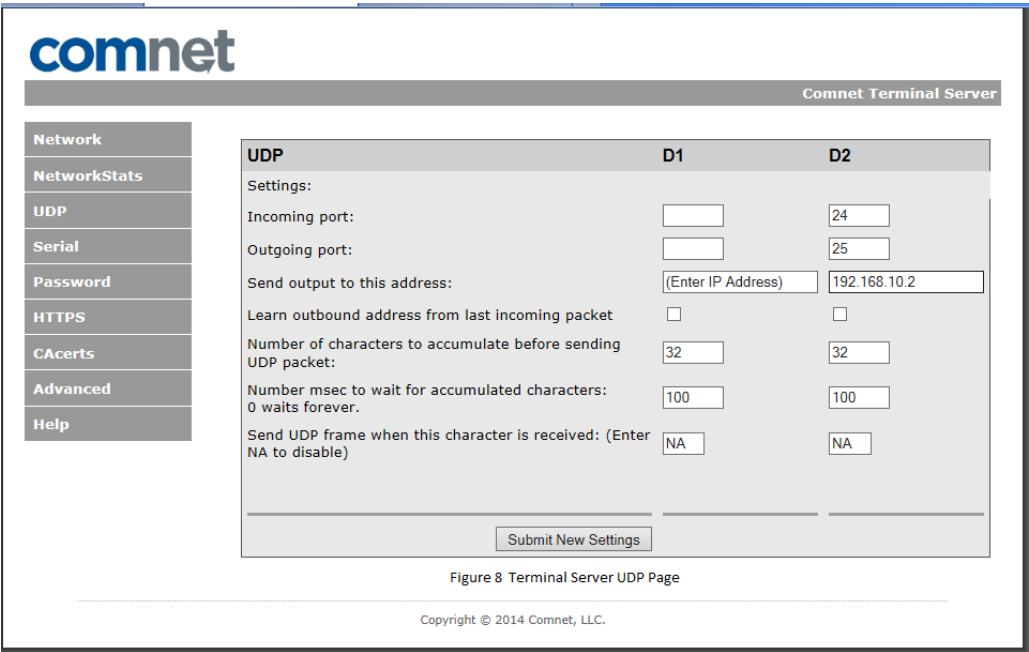


Figure 8 Terminal Server UDP Page

- » Click Serial link
- » Configure Port1 for RS422

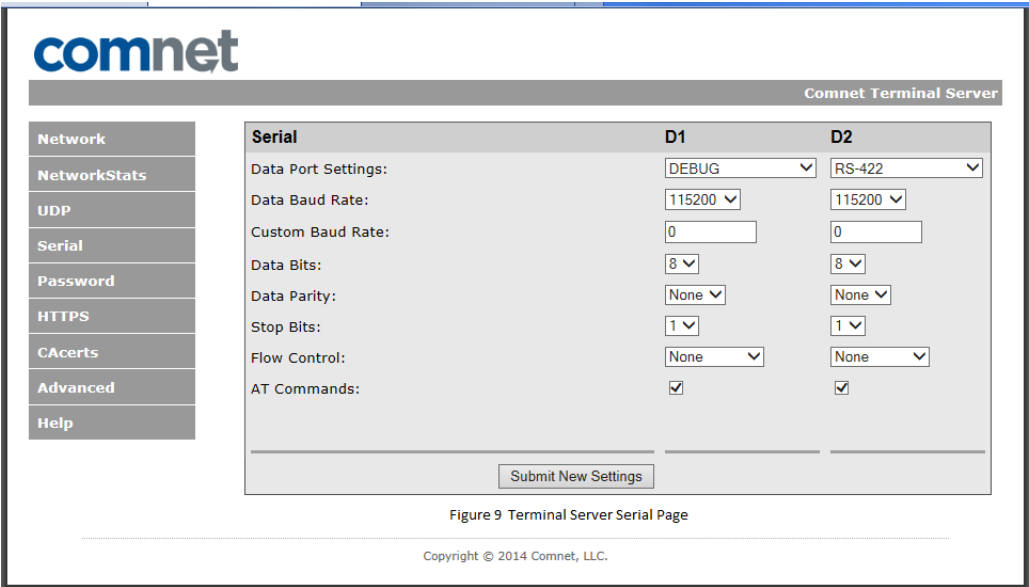


Figure 9 Terminal Server Serial Page

## Configure Client

» Set protocol to UDP on Network page.

**comnet** Comnet Terminal Server

### Comnet Terminal server

**Network**

Protocol:  (Changing will terminate all existing connections)

Device Name (for DHCP):

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

Static Settings	DHCP Assigned Values	Address Mode
Device IP Address: <input type="text" value="192.168.10.2"/>		<input type="text" value="Static IP"/>
Device Subnet Mask: <input type="text" value="255.255.255.0"/>		
Device Gateway: <input type="text" value="0.0.0.0"/>		
DNS Server: <input type="text" value="0.0.0.0"/>		
NTP Server: <input type="text" value="pool.ntp.org"/>	0.0.0.0	No network gateway to get time
System Time: No valid time UTC (When page was loaded)		

Figure 10 Terminal Client Network Page

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Figure 10 Terminal Client Network Page

» Click UDP link

» Configure Port1 to receive on port 25 & to transmit to 192.168.10.1 on port 24

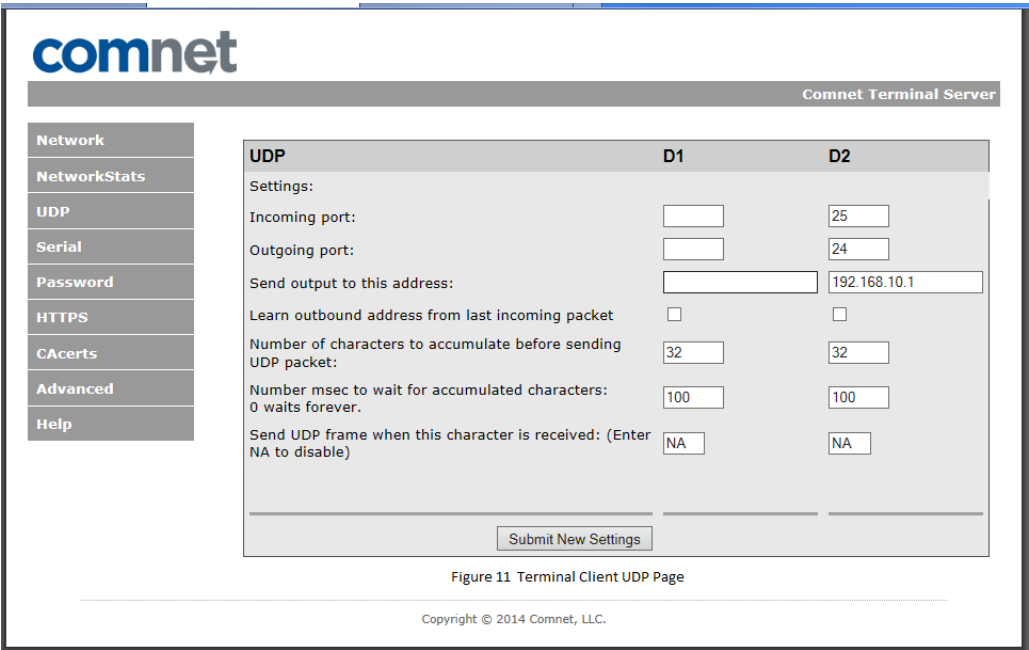


Figure 11 Terminal Client UDP Page

- » Click Serial link
- » Configure Port1 for RS422

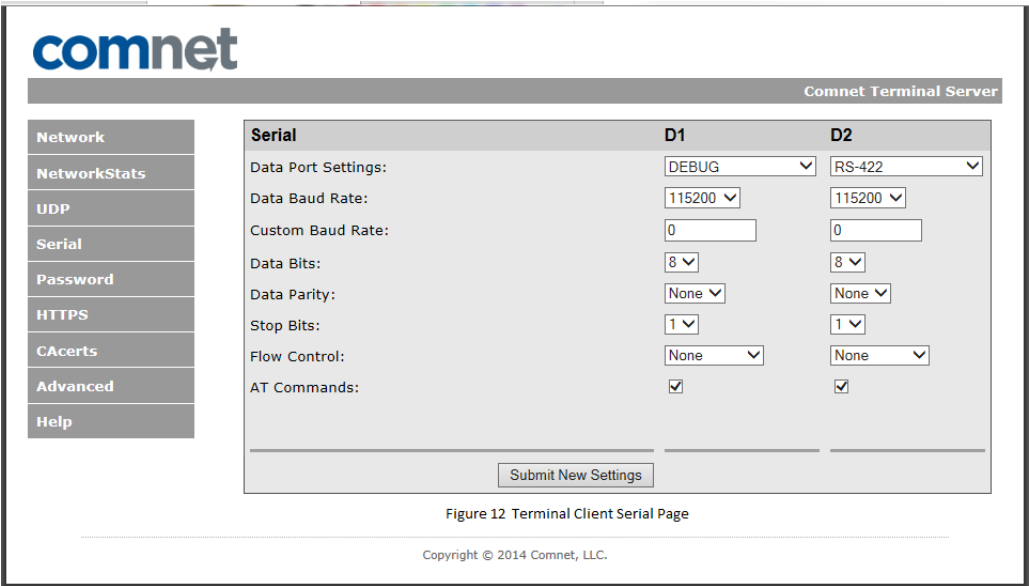


Figure 12 Terminal Client Serial Page



## SSL Transport

To use the Terminal Server as a serial extender over Ethernet utilizing SSL, connect two terminal servers to your local Ethernet network and configure devices as a client server connection.

### Configure Server

» Set protocol to TCP/SSL on Network page.

**comnet** Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol:  (Changing will terminate all existing connections)

Device Name (for DHCP):

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

**Static Settings**

Device IP Address:

Device Subnet Mask:

Device Gateway:

DNS Server:

NTP Server:

System Time: No valid time UTC (When page was loaded)

**DHCP Assigned Values**

0.0.0.0

**Address Mode**

Figure 13 Terminal Server Network Page

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Figure 13 Terminal Server Network Page

- » Click TCP link
- » Configure Port1 to listen for incoming connections on port 24
- » Check "USE SSL rather than TCP for connection"

comnet

Comnet Terminal Server

Network

NetworkStats

TCP

Serial

Password

HTTPS

CAcerts

Advanced

Help

TCP

D1

D2

Listen for incoming network connections

☐

☒

Listening network port:

Timeout and disconnect after this many seconds of inactivity.

Allow new connection if the existing connection has been idle for this many seconds.

When to begin making outgoing tcp connections:

Connect on network port:

Connect to this address:

Alternate address:

Timeout and disconnect after this many seconds of inactivity.

Retry failed outgoing connections after this many seconds.

Check and maintain valid connection at intervals in seconds.

Use custom packetization logic (below)

☐

☐

Number of characters to accumulate before sending TCP packet:

Number of msec to wait for accumulated characters:  
0 waits forever.

Flush TCP frame when this character is received (Enter NA to disable):

USE SSL rather than TCP for connections:

☐

☒

Always Save Serial Chars regardless of connection status:

☐

☐

Network Settings on Serial Port -  
Advanced Serial Settings

Figure 14 Terminal Server TCP Page

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Figure 14 Terminal Server TCP Page

- » Click Serial link
- » Configure Port1 for RS422

**comnet** Comnet Terminal Server

**Serial**

	D1	D2
Data Port Settings:	DEBUG	RS-422
Data Baud Rate:	115200	115200
Custom Baud Rate:	0	0
Data Bits:	8	8
Data Parity:	None	None
Stop Bits:	1	1
Flow Control:	None	None
AT Commands:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Submit New Settings

Figure 15 Terminal Server Serial Page

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Figure 15 Terminal Server Serial Page

- » Click HTTPS link
- » Select Choose File and load Certificate "device.crt"
- » Select Choose File and load Certificate key "device.key"

**comnet** Comnet Terminal Server

**HTTPS**

SSL Public Key Certificate User Installed

RSA Public/Private Key Pair User Installed Display Public Key

Certificate File to Install  Browse...

Key File to Install  Browse...

Install Certificate and Key

HTTPS - Hypertext Transfer Protocol over Secure Shell Layer (HTTPS) secure web site settings.  
Key size must be at least 128 and no more than 1024 and in openssl(openSSH) format.

Figure 16 Terminal Server Certificate and key files

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Figure 16 Terminal Server Certificate and key files

- » Select Install Certificate and Key

## Configure Client

» Set protocol to TCP/SSL on Network page.

**comnet** Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol:  (Changing will terminate all existing connections)

Device Name (for DHCP):

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

**Static Settings**

Device IP Address:

Device Subnet Mask:

Device Gateway:

DNS Server:

NTP Server:

System Time: No valid time UTC (When page was loaded)

**DHCP Assigned Values**

**Address Mode**

Figure 17 Terminal Client Network Page

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Figure 17 Terminal Client Network Page

- » Click TCP link
- » Configure Port1 to connect to 192.168.10.1 port 24
- » Check "USE SSL rather than TCP for connection"

	D1	D2
<b>TCP</b>		
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input type="checkbox"/>
Listening network port:	<input type="text" value="0"/>	<input type="text" value="24"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
Allow new connection if the existing connection has been idle for this many seconds.	<input type="text" value="30"/>	<input type="text" value="30"/>
<b>When to begin making outgoing tcp connections:</b>	<input type="text" value="Never"/>	<input type="text" value="If serial data received"/>
Connect on network port:	<input type="text"/>	<input type="text" value="24"/>
Connect to this address:	<input type="text"/>	<input type="text" value="192.168.10.1"/>
Alternate address:	<input type="text"/>	<input type="text"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
Retry failed outgoing connections after this many seconds.	<input type="text" value="360"/>	<input type="text" value="360"/>
Check and maintain valid connection at intervals in seconds.	<input type="text" value="0"/>	<input type="text" value="0"/>
<b>Use custom packetization logic (below)</b>	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending TCP packet:	<input type="text" value="32"/>	<input type="text" value="32"/>
Number of msec to wait for accumulated characters: 0 waits forever.	<input type="text" value="100"/>	<input type="text" value="100"/>
Flush TCP frame when this character is received (Enter NA to disable):	<input type="text" value="NA"/>	<input type="text" value="NA"/>
USE SSL rather than TCP for connections:	<input type="checkbox"/>	<input type="checkbox"/>
Always Save Serial Chars regardless of connection status:	<input type="checkbox"/>	<input type="checkbox"/>
<b>Network Settings on Serial Port - Advanced Serial Settings</b>		
<input type="button" value="Submit New Settings"/>		

Figure 18 Terminal Client TCP Page

Copyright © 2014 Comnet, LLC.

Figure 18 Terminal Client TCP Page

- » Click Serial link
- » Configure Port1 for RS422

The screenshot shows the 'Comnet Terminal Server' interface. On the left is a navigation menu with links: Network, NetworkStats, TCP, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The 'Serial' link is selected. The main area is titled 'Serial' and contains configuration settings for two ports, D1 and D2. The settings include Data Port Settings (DEBUG, RS-422), Data Baud Rate (115200), Custom Baud Rate (0), Data Bits (8), Data Parity (None), Stop Bits (1), Flow Control (None), and AT Commands (checked). A 'Submit New Settings' button is at the bottom.

comnet

Comnet Terminal Server

Serial

Data Port Settings: DEBUG RS-422

Data Baud Rate: 115200 115200

Custom Baud Rate: 0 0

Data Bits: 8 8

Data Parity: None None

Stop Bits: 1 1

Flow Control: None None

AT Commands: ☒ ☒

Submit New Settings

Figure 19 Terminal Client Serial Page

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*Figure 19 Terminal Client Serial Page*

- » Click CAcerts link
- » Select Choose File and load Certificate "CA.crt"

The screenshot shows the 'Comnet Terminal Server' interface with the 'CAcerts' link selected in the navigation menu. The main area displays a table with columns: CN Name, Public Key Link, and Delete. Below the table is a 'Certificate File to Install' section with a file path 'C:\nburn\pctools\BatchU', a 'Browse...' button, and an 'Add New client CA' button. A note states: 'Key size must be at least 128 and no more than 1024 and in openssl(openssh) format.'

comnet

Comnet Terminal Server

CN Name	Public Key Link	Delete
	Show PublicKey	Delete

Certificate File to Install C:\nburn\pctools\BatchU Browse... Add New client CA

Key size must be at least 128 and no more than 1024 and in openssl(openssh) format.

Figure 20 Terminal Client Certificate Authority certificate file

Copyright © 2014 Comnet, LLC.

*Figure 20 Terminal Client Certificate Authority certificate file*

- » Select Add New client CA

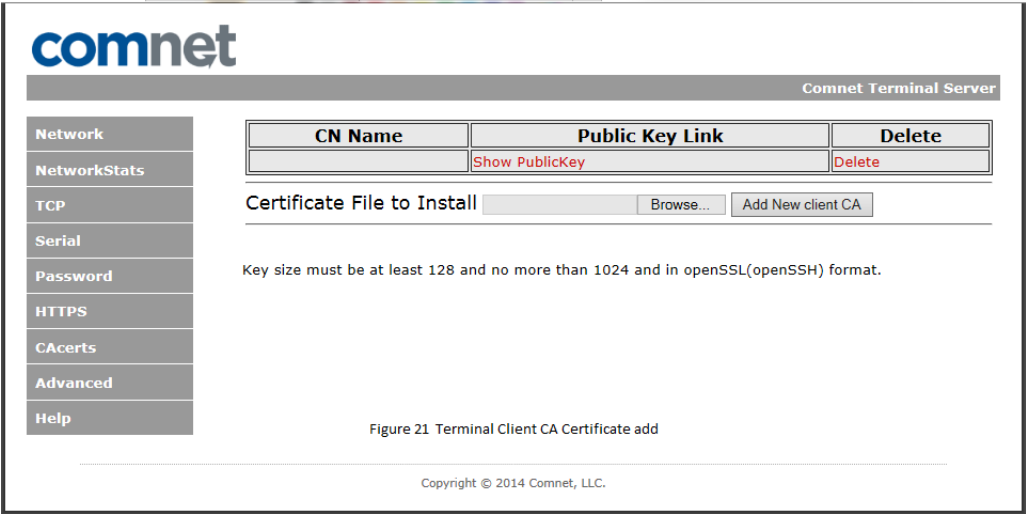


Figure 21 Terminal Client CA Certificate add

## Creating openssl certificates

» Open terminal on a Linux machine

### Client Certificate

```
development@ubuntu:~/ssl$
development@ubuntu:~/ssl$
development@ubuntu:~/ssl$ openssl genrsa -out CA.key 1024
Generating RSA private key, 1024 bit long modulus
.....+++++
e is 65537 (0x10001)
development@ubuntu:~/ssl$ openssl req -new -key CA.key -x509 -days 365 -out CA.crt
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:US
State or Province Name (full name) [Some-State]:California
Locality Name (eg, city) []:San Diego
Organization Name (eg, company) [Internet Widgits Pty Ltd]:Comnet
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:192.168.10.2
Email Address []:
development@ubuntu:~/ssl$ ls -l
total 8
-rw-rw-r-- 1 development development 940 Feb  6 09:29 CA.crt
-rw-rw-r-- 1 development development 887 Feb  6 09:26 CA.key
development@ubuntu:~/ssl$
```

Figure 22 Client Self Signed Certificate

### Server Certificate

```
development@ubuntu:~/ssl$
development@ubuntu:~/ssl$ openssl genrsa -out device.key 1024
Generating RSA private key, 1024 bit long modulus
.....+++++
e is 65537 (0x10001)
development@ubuntu:~/ssl$
development@ubuntu:~/ssl$ openssl req -new -key device.key -out device.csr
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:US
State or Province Name (full name) [Some-State]:California
Locality Name (eg, city) []:San Diego
Organization Name (eg, company) [Internet Widgits Pty Ltd]:Comnet
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:192.168.10.1
Email Address []:

Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:
An optional company name []:
development@ubuntu:~/ssl$
development@ubuntu:~/ssl$ openssl x509 -req -days 365 -in device.csr -CA CA.crt -CAkey CA.key -CAcreateserial -out device.crt
Signature ok
subject=/C=US/ST=California/L=San Diego/O=Comnet/CN=192.168.10.1
Getting CA Private Key
development@ubuntu:~/ssl$
```

Figure 23 Server Self Signed Certificate



```
development@ubuntu:~/ssl$  
development@ubuntu:~/ssl$ ls -l  
total 24  
-rw-rw-r-- 1 development development 940 Feb  6 09:29 CA.crt  
-rw-rw-r-- 1 development development 887 Feb  6 09:26 CA.key  
-rw-rw-r-- 1 development development  17 Feb  6 09:39 CA.srl  
-rw-rw-r-- 1 development development 822 Feb  6 09:39 device.crt  
-rw-rw-r-- 1 development development 639 Feb  6 09:36 device.csr  
-rw-rw-r-- 1 development development 887 Feb  6 09:34 device.key  
development@ubuntu:~/ssl$  
development@ubuntu:~/ssl$
```

*Figure 24 Client and Server Certificates & keys*

## SSH Transport

To use the Terminal Server to connect a serial device over Ethernet utilizing SSH, connect a terminal server and a laptop to your local Ethernet network configuring both devices as a client server connection.

### Configure Server

- » Set protocol to SSH on Network page.

**comnet** Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol: SSH (Changing will terminate all existing connections)

Device Name (for DHCP): SB70LCSX-6B54

NetBIOS Name: SB70LCSX-6B54

MAC Address: 00:03:F4:0A:6B:54

NB Version: 02.07.0000

Comnet Version: 2.0.0

**Static Settings**

Device IP Address: 192.168.10.1

Device Subnet Mask: 255.255.255.0

Device Gateway: 0.0.0.0

DNS Server: 0.0.0.0

NTP Server: pool.ntp.org

System Time: No valid time UTC (When page was loaded)

**DHCP Assigned Values**

0.0.0.0

**Address Mode**

Static IP

Reset To Factory Defaults Submit New Settings

Figure 25 Terminal Server Network Page

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Figure 25 Terminal Server Network Page

- » Click SSH link
- » Configure Port1 to listen for incoming connections on port 22

**comnet** Comnet Terminal Server

SSH	D1	D2
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Listening network port:	<input type="text" value="0"/>	<input type="text" value="22"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="360"/>	<input type="text" value="360"/>
Allow new connection if the existing connection has been idle for this many seconds.	<input type="text" value="180"/>	<input type="text" value="180"/>
<b>Use custom packetization logic (below)</b>	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending TCP packet:	<input type="text" value="32"/>	<input type="text" value="32"/>
Number msec to wait for accumulated characters: 0 waits forever.	<input type="text" value="100"/>	<input type="text" value="100"/>
Flush TCP frame when this character is received (Enter NA to disable):	<input type="text" value="NA"/>	<input type="text" value="NA"/>
<b>SSH Keys</b> <a href="#">SSH Keys</a>		
<b>Network Settings on Serial Port - Advanced Serial Settings</b>		
<input type="button" value="Submit New Settings"/>		

Figure 26 Terminal Server SSH Page

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Figure 26 Terminal Server SSH Page

- » Click SSH Keys link
- » Click Choose File and select ssh rsa key pair "id\_rsa"
- » Click Install Key

**comnet** Comnet Terminal Server

SSH Keys		
RSA Public/Private Key Pair	User Installed	<a href="#">Display Public Key</a>
DSA Public/Private Key Pair	Default	<a href="#">Display Public Key</a>
RSA or DSA Key File to Install	<input type="text" value="teOne\SSL Certs\id_rsa"/> <input type="button" value="Browse..."/>	
<input type="button" value="Install Key"/>		

SSH Keys - Key size must be at least 512 and no more than 4096 and in openSSH(openSSL) format.

Figure 27 Terminal Server Keys Page

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Figure 27 Terminal Server Keys Page

- » Click Serial link
- » Configure Port1 for RS422

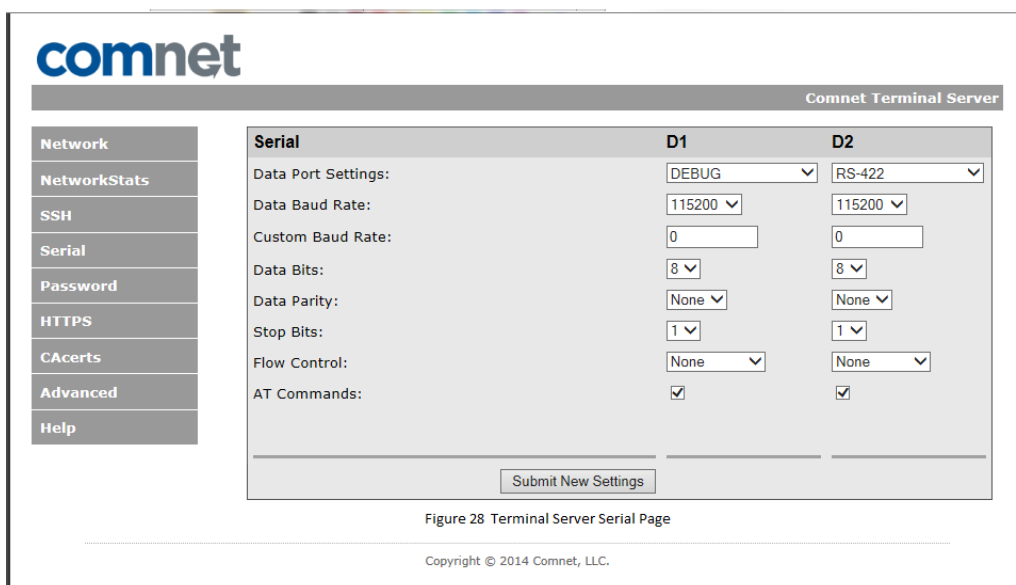


Figure 28 Terminal Server Serial Page

## Configure Client Laptop

- » Open Tera Term and select SSH and TCP port 22

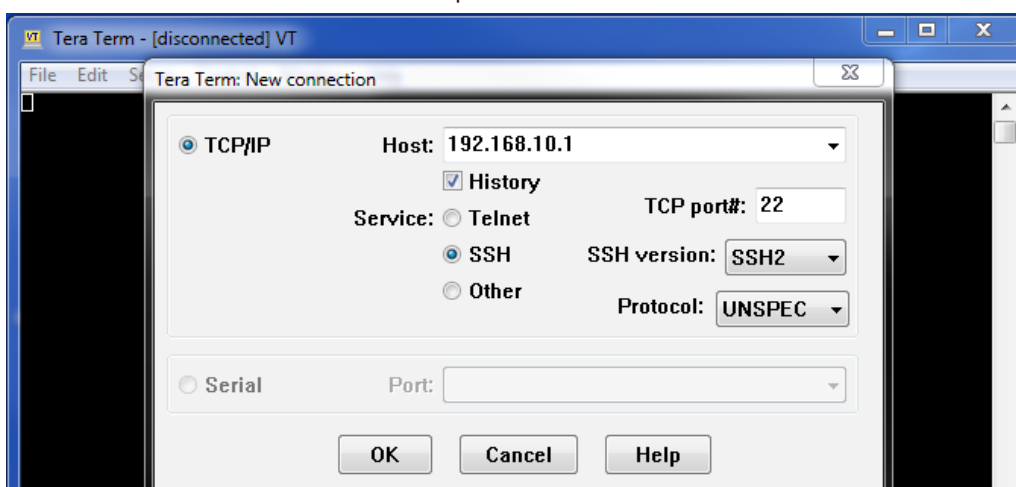
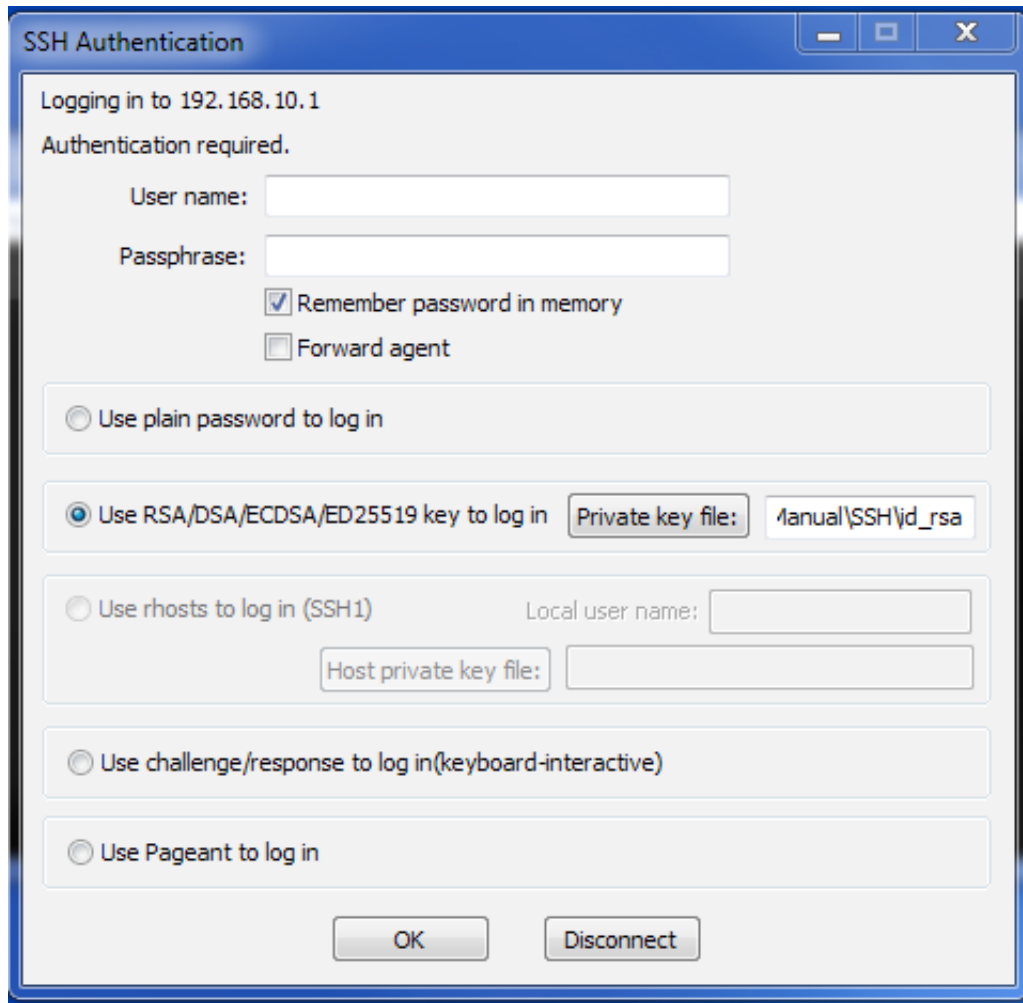


Figure 29 Terminal Client Tera Term

- » On SSH Authentication Pop Up click RSA and select Private key file id\_rsa



The image shows a Windows-style dialog box titled "SSH Authentication". It has a blue title bar with standard minimize, maximize, and close buttons. The main content area is light gray and contains the following elements:

- Text: "Logging in to 192.168.10.1"
- Text: "Authentication required."
- Text: "User name:" followed by a text input field.
- Text: "Passphrase:" followed by a text input field.
- Checkboxes:
  - ☒ Remember password in memory
  - ☐ Forward agent
- Radio buttons for authentication methods:
  - ☐ Use plain password to log in
  - ☒ Use RSA/DSA/ECDSA/ED25519 key to log in. To the right of this is a "Private key file:" label and a text box containing "Manual\SSH\jd\_rsa".
  - ☐ Use rhosts to log in (SSH1). To the right of this is a "Local user name:" label and a text box.
  - Below the rhosts option is a "Host private key file:" label and a text box.
  - ☐ Use challenge/response to log in(keyboard-interactive)
  - ☐ Use Pageant to log in
- Buttons: "OK" and "Disconnect" at the bottom.

Figure 30 Terminal Client Tera Term SSH Authentication

## Creating SSH key pairs

Open terminal on a linux machine

```

RStrempe1@8257RSTREMP1 /c/nburn/pctools/BatchUpdateOne/SSL Certs
$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/y/.ssh/id_rsa): id_rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in id_rsa.
Your public key has been saved in id_rsa.pub.
The key fingerprint is:
21:f6:cb:ed:63:28:89:40:18:08:af:36:7e:1a:df:e2 RStrempe1@8257RSTREMP1
The key's randomart image is:
+--[ RSA 2048 ]-----+
|+
|o.
| o. o .
|... . o .
|. + S
|o o . o
| o o . . o .
| =.o o . . o
| ..E.. . ...
+-----+

RStrempe1@8257RSTREMP1 /c/nburn/pctools/BatchUpdateOne/SSL Certs
$ ls -l
total 12
-rw-r--r-- 1 RStrempe Administ 940 Feb 6 09:29 CA.crt
-rw-r--r-- 1 RStrempe Administ 887 Feb 6 09:26 CA.key
-rw-r--r-- 1 RStrempe Administ 17 Feb 6 09:39 CA.srl
-rw-r--r-- 1 RStrempe Administ 205 Feb 6 13:00 Self Signed Certs.txt
-rw-r--r-- 1 RStrempe Administ 822 Feb 6 09:39 device.crt
-rw-r--r-- 1 RStrempe Administ 639 Feb 6 09:36 device.csr
-rw-r--r-- 1 RStrempe Administ 887 Feb 6 09:34 device.key
-rw-r--r-- 1 RStrempe Administ 1675 Feb 6 13:01 id_rsa
-rw-r--r-- 1 RStrempe Administ 405 Feb 6 13:01 id_rsa.pub
-rw-r--r-- 1 RStrempe Administ 13044 Feb 6 12:42 ssh2connect.log

RStrempe1@8257RSTREMP1 /c/nburn/pctools/BatchUpdateOne/SSL Certs
$

```

Figure 31 Creating SSH key pairs

## Telnet Transport

To use the Terminal Server to connect a serial device over Ethernet utilizing Telnet, connect a terminal server and a laptop to your local Ethernet network configuring both devices as a client server connection.

### Configure Server

- » Set protocol to TCP on Network page.

**comnet** Comnet Terminal Server

**Comnet Terminal server**

**Network**

Protocol:  (Changing will terminate all existing connections)

Device Name (for DHCP):

NetBIOS Name:

MAC Address:

NB Version:

Comnet Version:

**Static Settings**

Device IP Address:

Device Subnet Mask:

Device Gateway:

DNS Server:

NTP Server:

System Time:

**DHCP Assigned Values**

**Address Mode**

Figure 32 Terminal Server Network Page

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Figure 32 Terminal Server Network Page

- » Click TCP link
- » Configure Port1 to listen for incoming connections on port 24

TCP	D1	D2
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Listening network port:	<input type="text" value="0"/>	<input type="text" value="24"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
Allow new connection if the existing connection has been idle for this many seconds.	<input type="text" value="30"/>	<input type="text" value="30"/>
<b>When to begin making outgoing tcp connections:</b>	<input type="text" value="Never"/>	<input type="text" value="Never"/>
Connect on network port:	<input type="text"/>	<input type="text"/>
Connect to this address:	<input type="text"/>	<input type="text"/>
Alternate address:	<input type="text"/>	<input type="text"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>
Retry failed outgoing connections after this many seconds.	<input type="text" value="360"/>	<input type="text" value="360"/>
Check and maintain valid connection at intervals in seconds.	<input type="text" value="0"/>	<input type="text" value="0"/>
<b>Use custom packetization logic (below)</b>	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending TCP packet:	<input type="text" value="32"/>	<input type="text" value="32"/>
Number of msec to wait for accumulated characters: 0 waits forever.	<input type="text" value="100"/>	<input type="text" value="100"/>
Flush TCP frame when this character is received (Enter NA to disable):	<input type="text" value="NA"/>	<input type="text" value="NA"/>
USE SSL rather than TCP for connections:	<input type="checkbox"/>	<input type="checkbox"/>
Always Save Serial Chars regardless of connection status:	<input type="checkbox"/>	<input type="checkbox"/>
<b>Network Settings on Serial Port - Advanced Serial Settings</b>		
<input type="button" value="Submit New Settings"/>		

Figure 33 Terminal Server TCP Page

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Figure 33 Terminal Server TCP Page

- » Click Serial link
- » Configure Port1 for RS422



**comnet**

Comnet Terminal Server

Serial	D1	D2
Data Port Settings:	DEBUG	RS-422
Data Baud Rate:	115200	115200
Custom Baud Rate:	0	0
Data Bits:	8	8
Data Parity:	None	None
Stop Bits:	1	1
Flow Control:	None	None
AT Commands:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Submit New Settings

Figure 34 Terminal Server Serial Page

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Figure 34 Terminal Server Serial Page

## Configure Client Laptop

» Open Tera Term and select Telnet and TCP port 24

Tera Term: New connection

☒ TCP/IP      Host: 192.168.10.1

☒ History

Service: ☒ Telnet      TCP port#: 24

☐ SSH      SSH version: SSH2

☐ Other      Protocol: UNSPEC

☐ Serial      Port:

OK      Cancel      Help

Figure 35 Terminal Client Tera Term

## HTTPS Configuration

- » Click HTTPS
- » Select Certificate File to Install Choose File "device.crt"
- » Select Key File to Install. Choose File "device.key"
- » Click Install Certificate and Key

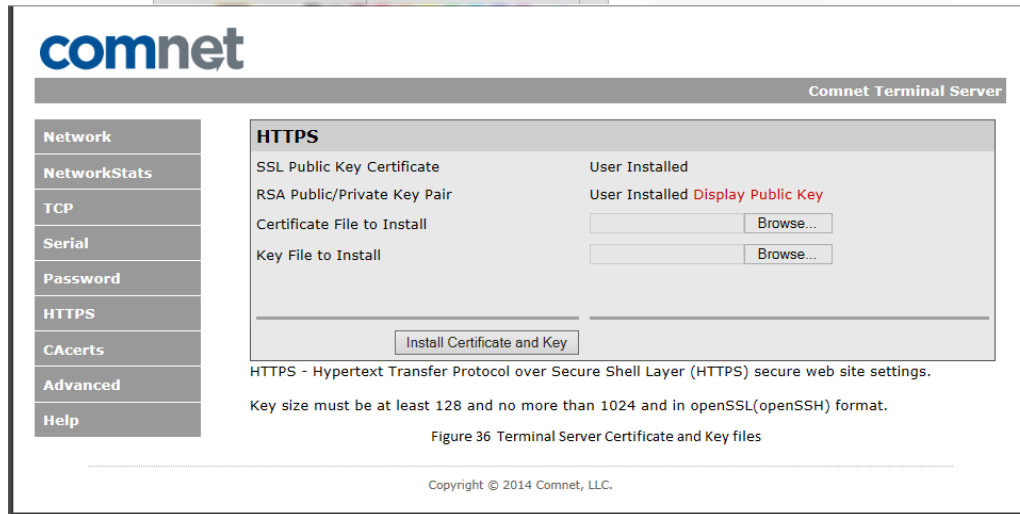


Figure 36 Terminal Server Certificate and Key files

## Internet Explorer Configuration

» Click on tools and select Internet options

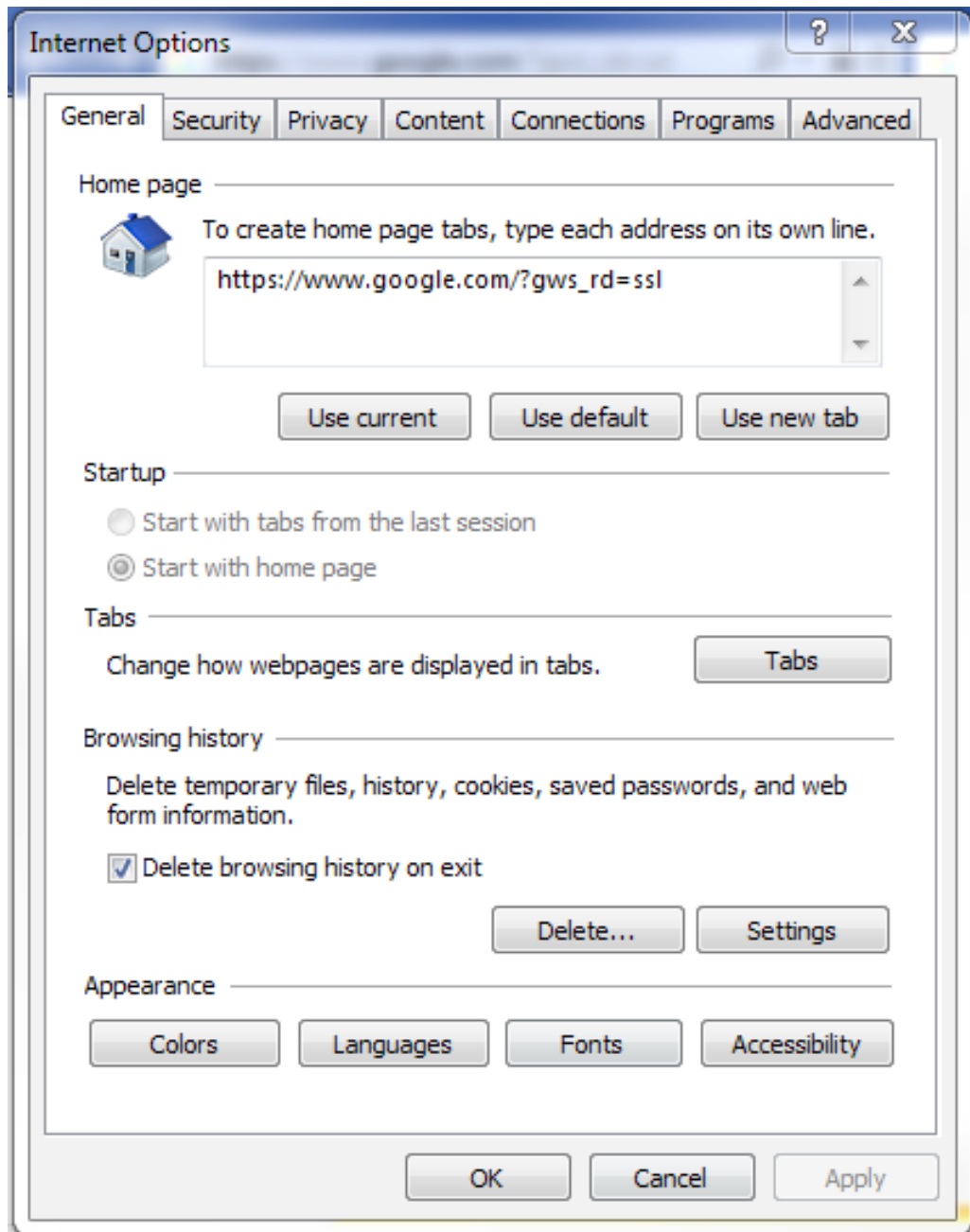


Figure 37 Terminal Client IE Options

» Click Content tab and click Certificates

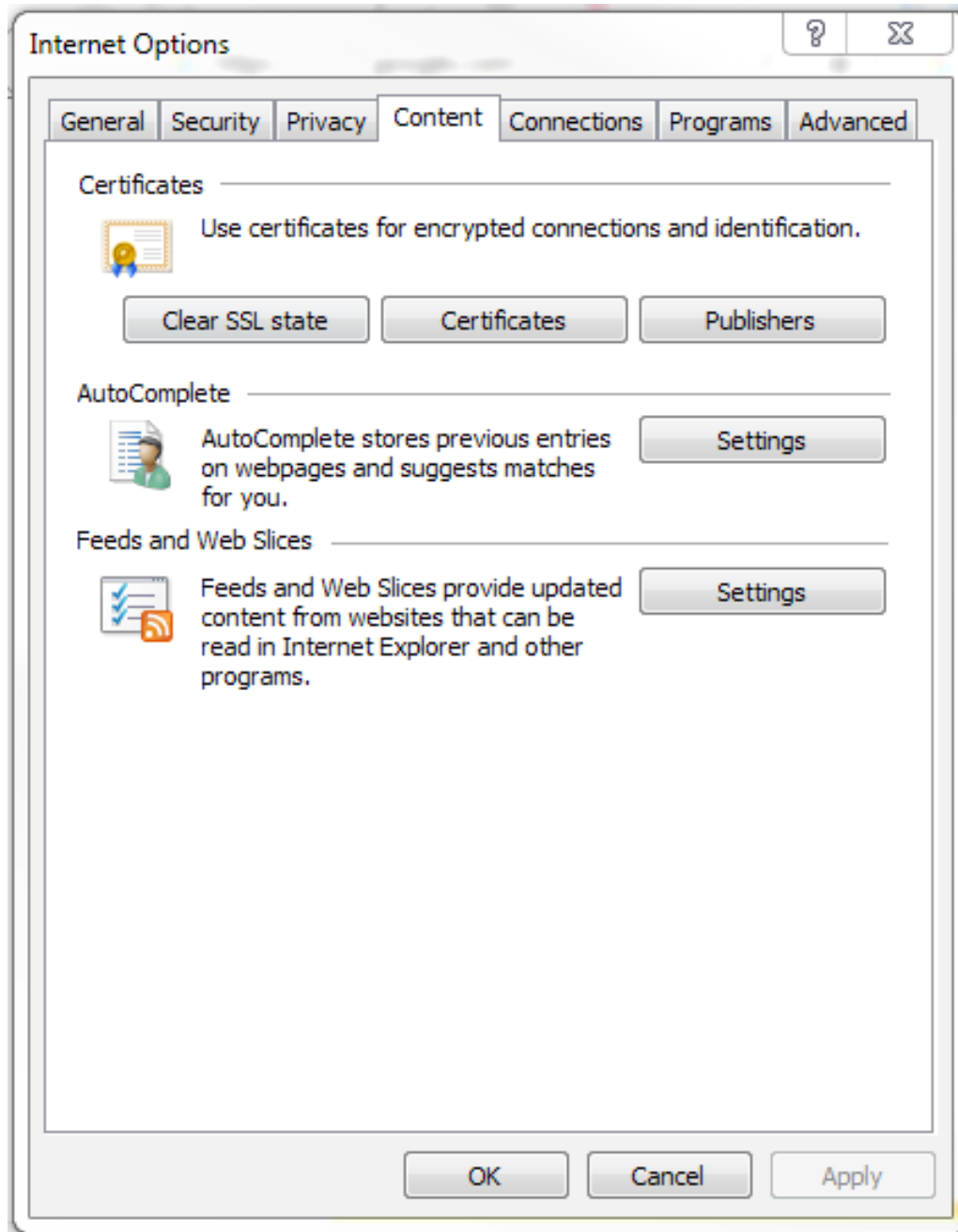


Figure 38 Terminal Client IE Certificates

» Click Trusted Root Certifications Authority tab

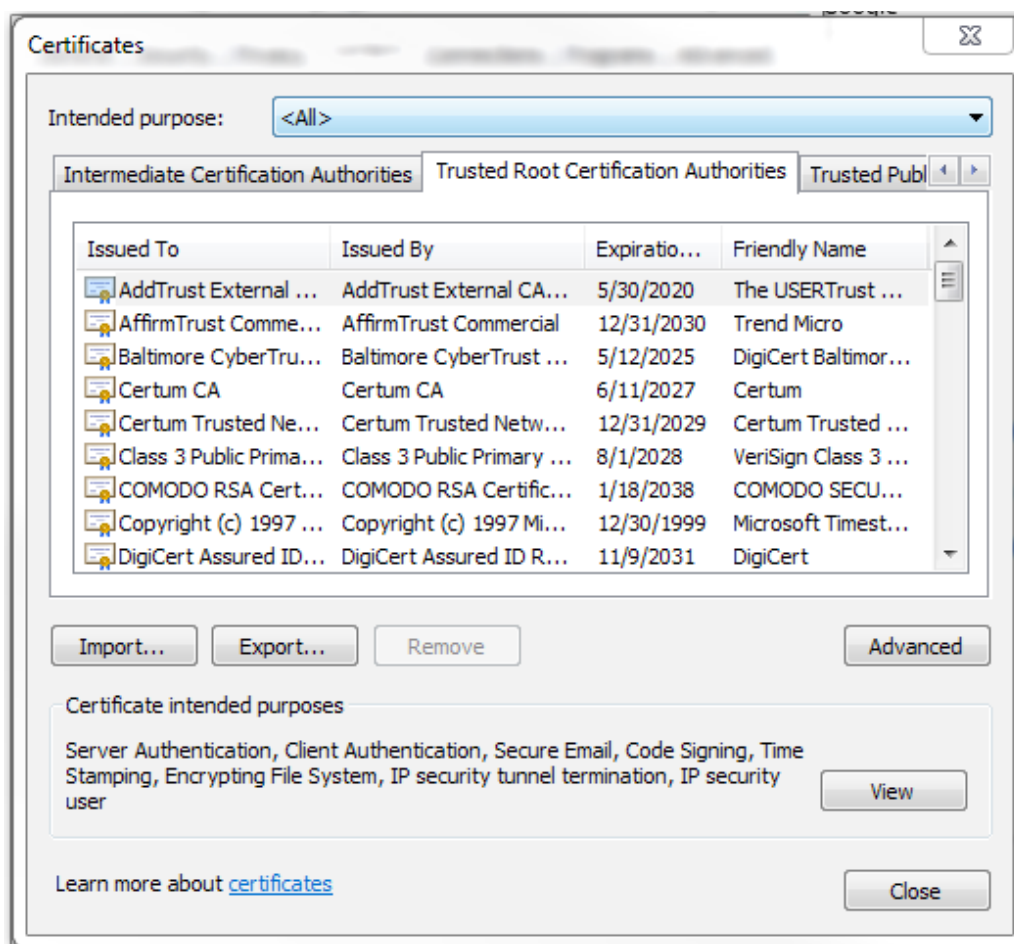


Figure 39 Terminal Client IE Root CA

- » Click Import...
- » Use wizard to load CA certificate "CA.crt"
- » Place in Trusted Root Certification Authorities

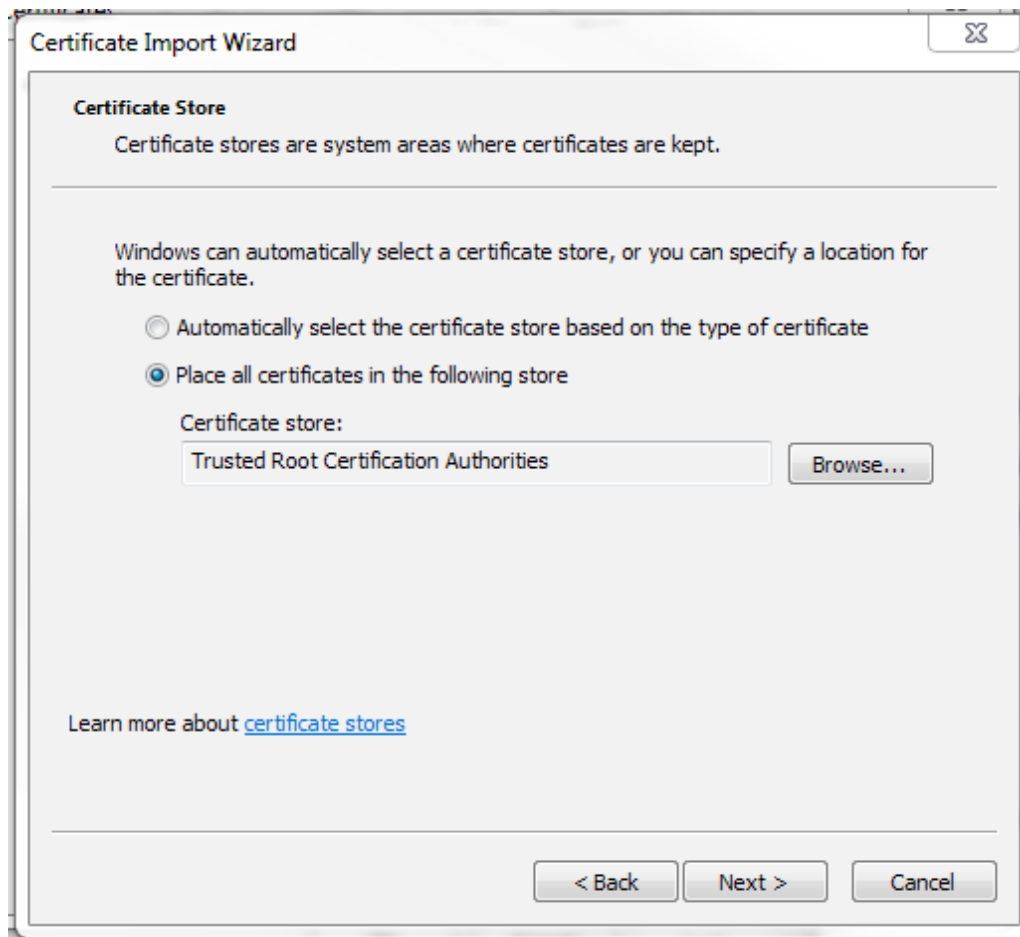


Figure 40 Terminal Client IE Certificate Store

- » Finish wizard and close Internet Explorer
- » Terminal Server is now accessible using HTTPS with Internet Explorer

## FireFox Configuration

» Click on tools and select options

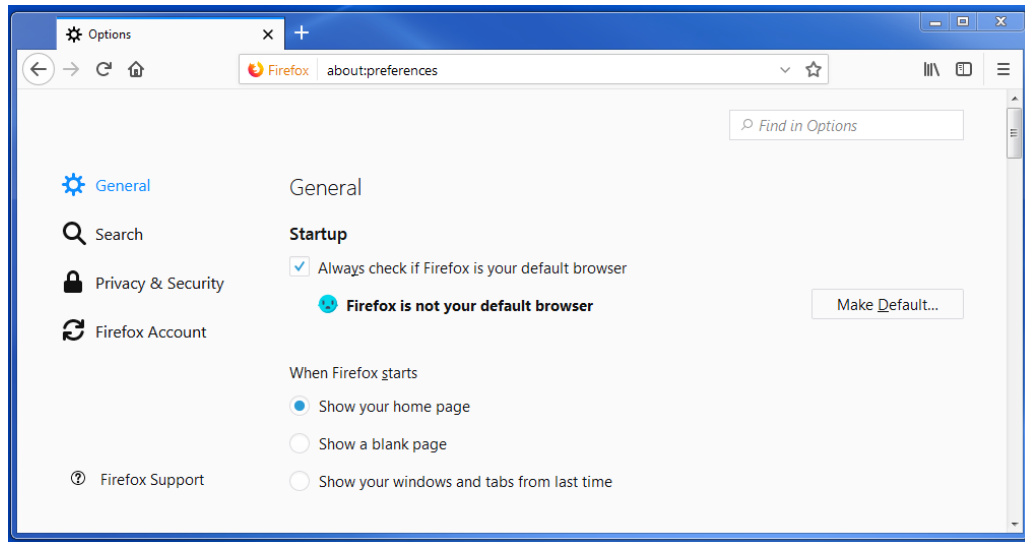


Figure 41 Terminal Client FireFox Options

» Click Privacy & Security

» Click View Certificates

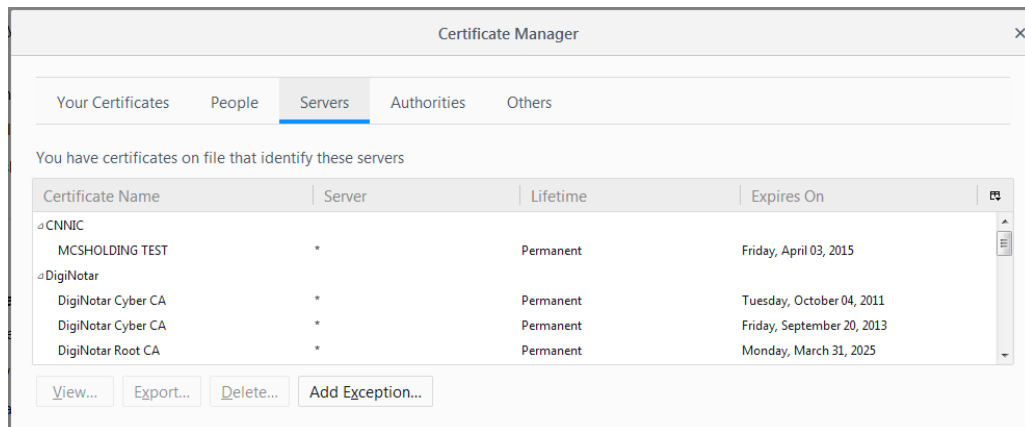


Figure 42 Terminal Client FireFox Certificate MGR

» Click Servers and Add Exception

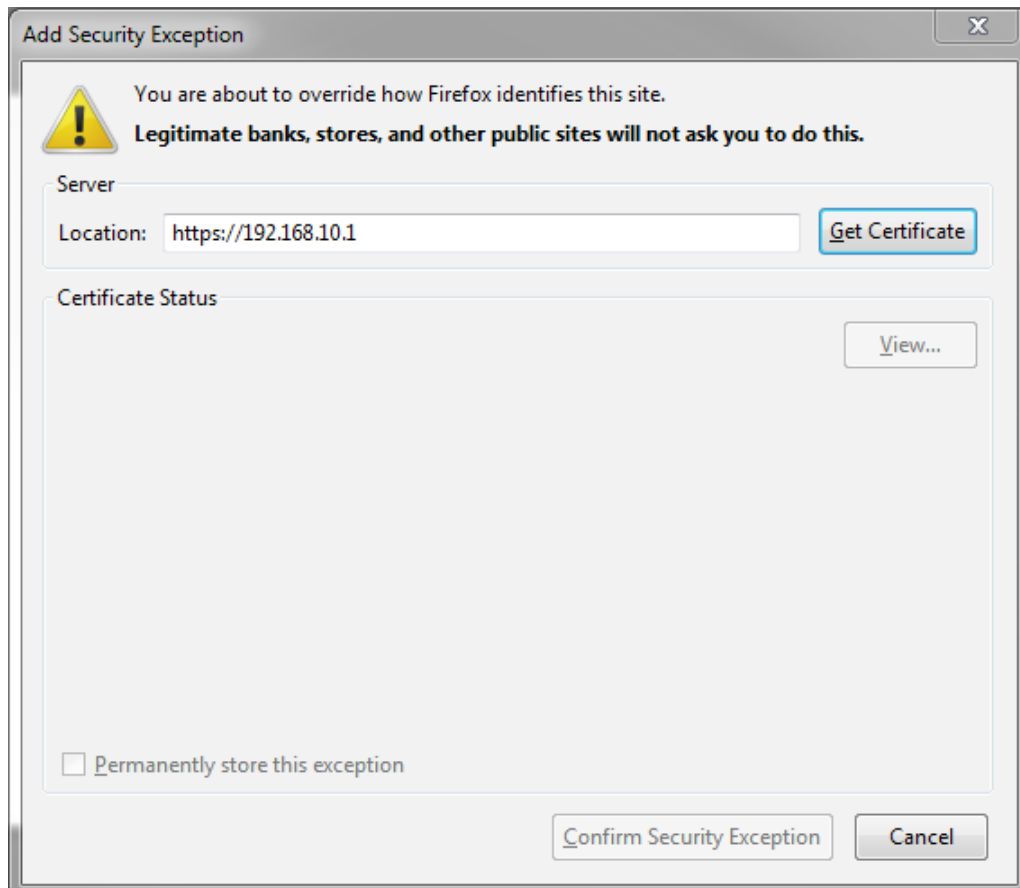


Figure 43 Terminal Client FireFox Exception

- » Click Get Certificate
- » Click Confirm Security Exception
- » Close FireFox
- » Terminal Server is now accessible using HTTPS with FireFox

## OpenSSL Certificate, key and CA for HTTPS

- » Use same SSL certificates



# Console Port Access

One serial port may be designated as a console port using USB to RS232 cable. The console port may be used to view and change the IP address as well as access other system information. Debug mode will not forward any serial data but is only used to access the terminal server host.

- » Click Serial Link
- » Configure Port0 for Debug

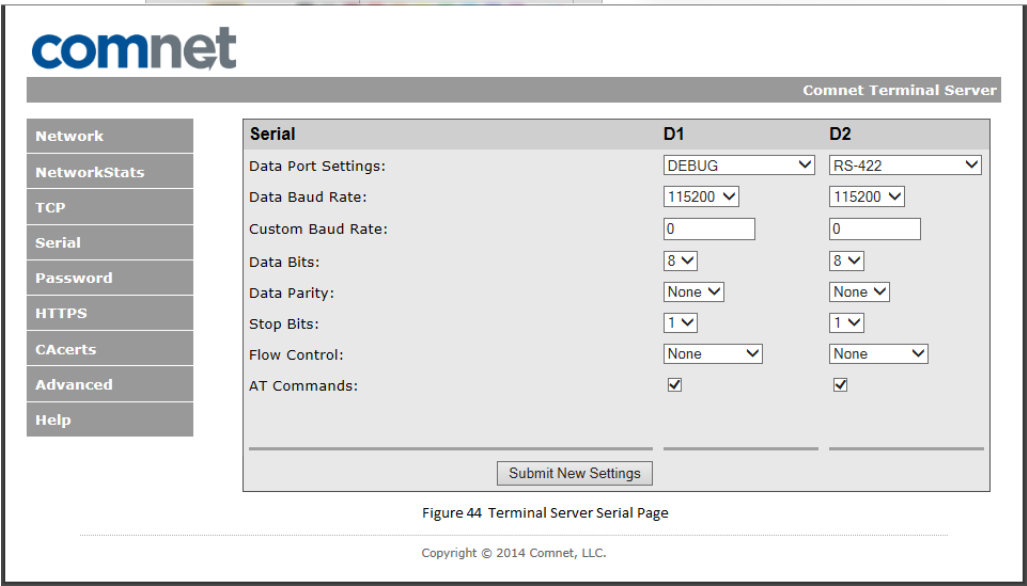


Figure 44 Terminal Server Serial Page

# Network Statistics

This page displays information on network statistics and TCP states. Each counter can be set by entering a value in the box and selecting "Submit New Settings". All the counters can be cleared by selecting "Clear All Stats". A page refresh will update the counters and TCP states.

- TX & RX frames

UDP TX & RX frames

TCP TX & RX frames

D1

D2
- total frames

- UDP protocol frames

- TCP protocol frames

- Serial data characters on Port D1

- Serial data characters on Port D2
- D1 TCP State

D2 TCP State
- States

Idle

Listening on Port 23 state

Connected to IP 192.168.10.200 state

States

Idle

Listening on Port 24 state

Connected to IP 192.168.10.201 state

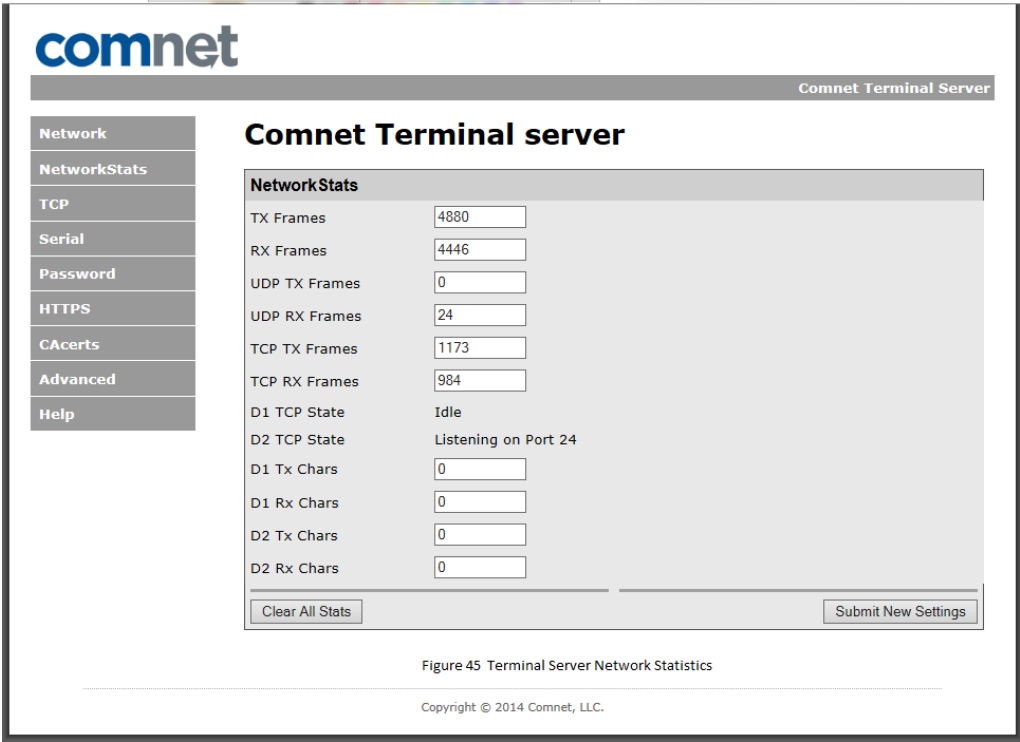


Figure 45 Terminal Server Network Statistics Page

## Factory Defaults

There are two methods to set the terminal server back to factory defaults.

- » Select "Reset to Factory Defaults" on the Network page.
- » Press the reset button on the device.

Factory defaults are

- » IP address 192.168.10.1/24
- » No gateway
- » D1 TCP port is configured for listening on port 23
- » D2 TCP port is configured for listening on port 24
- » D1 serial port is configured as a Debug console port 115200 baud 8 bit/no parity/1 stop
- » D2 serial port is configured for RS-232 115200 baud 8 bit/no parity/1 stop

The screenshot displays the Comnet Terminal Server web interface. On the left is a navigation menu with options: Network, NetworkStats, TCP, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The main content area is titled "Comnet Terminal server" and shows the "Network" configuration page. The "Protocol" is set to "TCP/SSL" with a note that changing it will terminate all existing connections. The "Device Name (for DHCP)" is "SB70LCSX-6B54", which is also the "NetBIOS Name". The "MAC Address" is "00:03:F4:0A:6B:54", "NB Version" is "02.07.0000", and "Comnet Version" is "2.0.0". Below these are three columns: "Static Settings" with fields for Device IP Address (192.168.10.1), Device Subnet Mask (255.255.255.0), Device Gateway (0.0.0.0), and DNS Server (0.0.0.0); "DHCP Assigned Values" which is currently empty; and "Address Mode" set to "Static IP". At the bottom, the "NTP Server" is "pool.ntp.org" and "System Time" is "No valid time UTC (When page was loaded)". There are two buttons at the bottom: "Reset To Factory Defaults" and "Submit New Settings".

Figure 46 Terminal Server Factory Defaults

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Figure 46 Terminal Server Factory Defaults Page Factory Defaults

## Upgrading Firmware

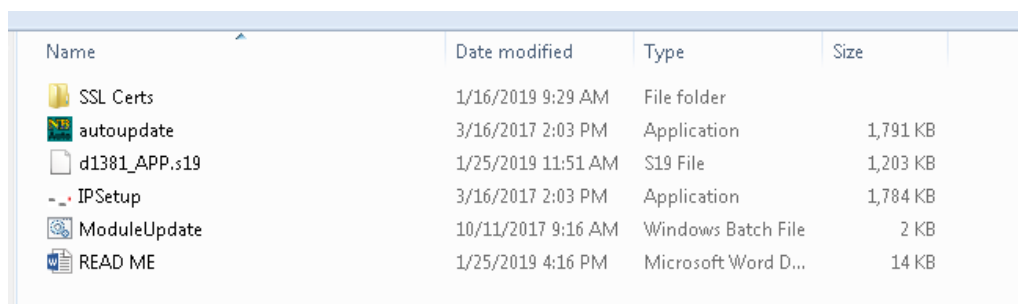
There are four files used to upgrade firmware on the terminal server.

<b>IPSetup</b>	Discovers terminal server on the local network and configures its IP Address.
<b>Autoupdate</b>	Loads the application using UDP.
<b>ModuleUpdate</b>	Batch file that invokes IPSetup & Autoupdate to configure terminal server with IP address 192.168.10.1 and loads application.
<b>D1381_APP.s19</b>	Application In s-record format.

### Module Update

- » Setup a local area network with laptop and module (terminal server) on the 192.168.10.0/24 subnet.
- » Install ModuleUpdate, IPSetup, Autoupdate & d1381\_APP.s19 in same directory.
- » Run ModuleUpdate batch file from command prompt where files reside.
- » Program will prompt "Connect Module to the network Press any to continue . . ."
- » Press any key, program will configure module with:

IP address: "192.168.10.1"  
 Subnet Mask: "255.255.255.0"  
 Gateway: "192.168.10.254"  
 Flash: d1381\_APP.s19



Name	Date modified	Type	Size
SSL Certs	1/16/2019 9:29 AM	File folder	
autoupdate	3/16/2017 2:03 PM	Application	1,791 KB
d1381_APP.s19	1/25/2019 11:51 AM	S19 File	1,203 KB
IPSetup	3/16/2017 2:03 PM	Application	1,784 KB
ModuleUpdate	10/11/2017 9:16 AM	Windows Batch File	2 KB
READ ME	1/25/2019 4:16 PM	Microsoft Word D...	14 KB

Figure 47 Upgrade Firmware Directory

Figure 47 Terminal Server Upgrade Firmware Director



## MECHANICAL INSTALLATION INSTRUCTIONS

### ComNet Customer Service

Customer Care is ComNet Technology's global service center, where our professional staff is ready to answer your questions at any time.

Email ComNet Global Service Center: [customercare@comnet.net](mailto:customercare@comnet.net)



3 CORPORATE DRIVE | DANBURY, CT 06810 | USA  
T: 203.796.5300 | F: 203.796.5303 | TECH SUPPORT: 1.888.678.9427 | [INFO@COMNET.NET](mailto:INFO@COMNET.NET)  
8 TURNBERRY PARK ROAD | GILDERSOME | MORLEY | LEEDS, UK LS27 7LE  
T: +44 (0)113 307 6400 | F: +44 (0)113 253 7462 | [INFO-EUROPE@COMNET.NET](mailto:INFO-EUROPE@COMNET.NET)