



## INSTALLATION AND OPERATION MANUAL

# CNFE3DOE2/M

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

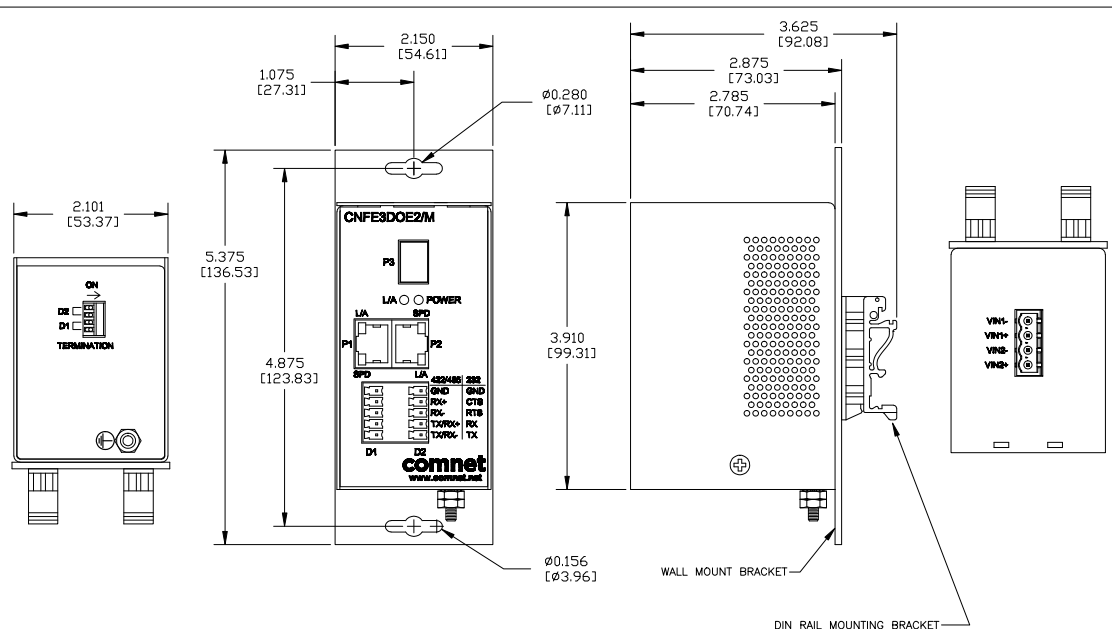
The ComNet CNFE3DOE2/M allows any combination of two RS-232, RS-422, or 2 or 4-wire RS-485 serial data circuits to be inserted onto any 10/100 Mbps Ethernet-based network. The CNFE3DOE2/M units include two serial data input/output ports, and three Ethernet ports featuring two electrical ports and one 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.

## Contents

<b>Hardware description</b>	<b>3</b>
<b>Assign IP Address to a Terminal Server</b>	<b>4</b>
<b>Using Terminal Server as a Serial Extender over Ethernet</b>	<b>8</b>
TCP Transport	8
UDP Transport	13
SSL Transport	17
Creating openssl certificates	23
SSH Transport	25
Creating SSH key pairs	29
Telnet Transport	29
<b>HTTPS Configuration</b>	<b>33</b>
OpenSSL Certificate, key and CA for HTTPS	39
<b>Console Port Access</b>	<b>40</b>

# Hardware description

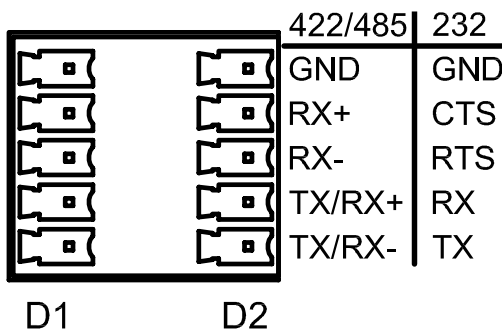
The ComNet CNFE3DOE2/M terminal server supports Ethernet transmission over two copper ports and one fiber port. The server is universally compatible with RS232, RS422, RS485 serial data protocols. All configurations are done through its web server. Distances depend on which SFP (Small Form Pluggable) 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

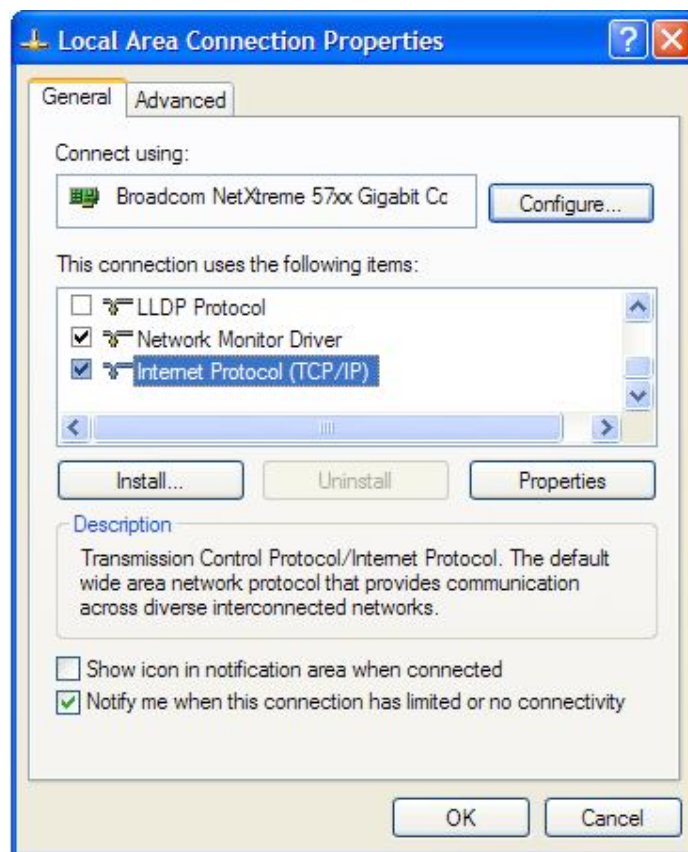
A unique IP address has to be assigned to each terminal server device. You can connect one at a time to change the default IP address. The default IP address of the device is the same: 192.168.10.1.

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

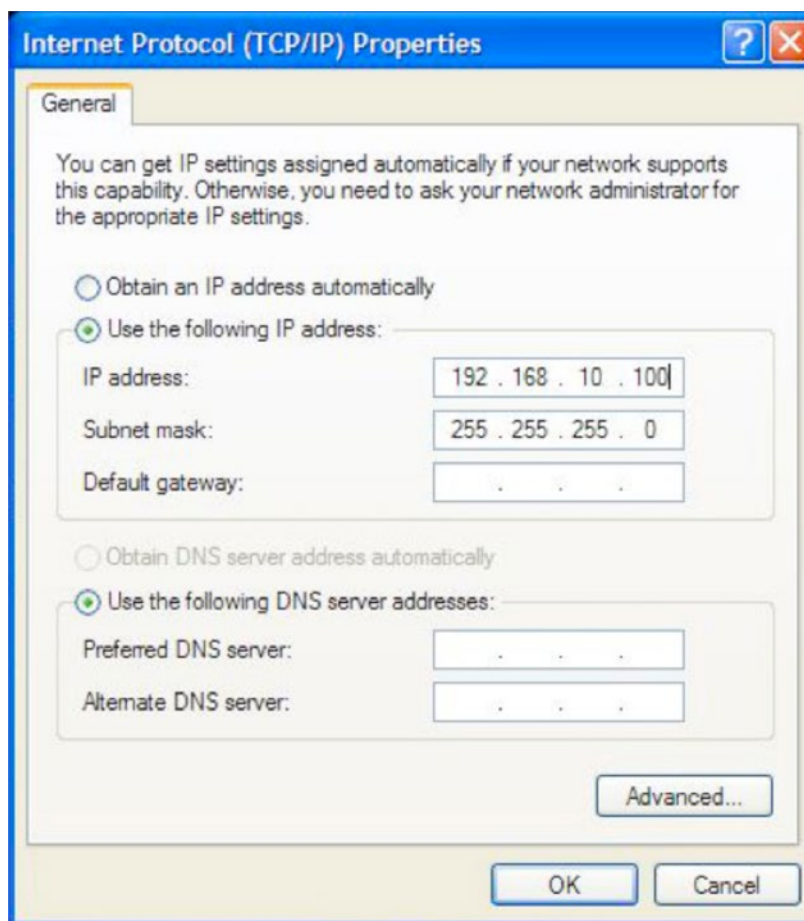
Follow the steps below to set up your PC IP address to the same subnet as the terminal servers.

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.

*Terminal Server Log in Pop-up*

*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**.

*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:

Version:

**Static Settings**

Device IP Address:

Device Subnet Mask:

Device Gateway:

DNS Server:

NTP Server:

System Time:

**DHCP Assigned Values**

**Address Mode**

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Figure 1 Terminal Server Network Page

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



TCP	Port0	Port1
<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"/>		

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Figure 2 Terminal Server TCP Page

- » Click Serial link
- » Configure Port1 for RS422

**comnet** Comnet Terminal Server

**Serial**

Serial	Port0	Port1
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

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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-6B5C

NetBIOS Name: SB70LCSX-6B5C

Version: 02.07.0000

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: 192.168.10.254		
DNS Server: 0.0.0.0		
NTP Server: pool.ntp.org	0.0.0.0	No DNS to look up NTP server
System Time: No valid time UTC (When page was loaded)		

Reset To Factory Defaults Submit New Settings

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Figure 4 Terminal Client Network Page

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

	Port0	Port1
<b>TCP</b>		
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input type="checkbox"/>
Listening network port:	0	0
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:		192.168.10.1
Alternate 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>		
<a href="#">Submit New Settings</a>		

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Figure 5 Terminal Client TCP Page

- » Click Serial link
- » Configure Port1 for RS422

comnet

Comnet Terminal Server

Network

TCP

Serial

Password

HTTPS

CAcerts

Advanced

Help

Serial

Port0

Port1

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

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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.

The screenshot displays the 'Comnet Terminal server' configuration interface. On the left is a sidebar menu with options: Network, UDP, Serial, Password, HTTPS, CACerts, Advanced, and Help. The 'Network' tab is selected. The main content area is titled 'Comnet Terminal server' and contains a 'Network' section. This section includes a 'Protocol' dropdown set to 'UDP' with a note '(Changing will terminate all existing connections)'. Below this are fields for 'Device Name (for DHCP)' (SB70LCSX-6B5C), 'NetBIOS Name' (SB70LCSX-6B5C), and 'Version' (02.07.0000). A table-like structure follows with three columns: 'Static Settings', 'DHCP Assigned Values', and 'Address Mode'. Under 'Static Settings' are fields for 'Device IP Address' (192.168.10.2), 'Device Subnet Mask' (255.255.255.0), 'Device Gateway' (192.168.10.254), and 'DNS Server' (0.0.0.0). Under 'DHCP Assigned Values' is the 'NTP Server' (pool.ntp.org) and a value of 0.0.0.0. Under 'Address Mode' is a 'Static IP' dropdown and the text 'No DNS to look up NTP server'. At the bottom of the settings area are two buttons: 'Reset To Factory Defaults' and 'Submit New Settings'. A copyright notice 'Copyright © 2014 Comnet, LLC.' is at the very bottom.

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

The screenshot shows the 'Comnet Terminal Server' interface with the 'UDP' tab selected in the left sidebar. The main area is divided into three columns: 'UDP', 'Port0', and 'Port1'. The 'UDP' column contains settings for incoming/outgoing ports, output address, and packet accumulation. The 'Port0' and 'Port1' columns have corresponding input fields for these settings. A 'Submit New Settings' button is at the bottom.

UDP	Port0	Port1
Settings:		
Incoming port:	<input type="text"/>	<input type="text" value="24"/>
Outgoing port:	<input type="text"/>	<input type="text" value="25"/>
Send output to this address:	<input type="text"/>	<input type="text" value="192.168.10.2"/>
Learn outbound address from last incoming packet	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending UDP 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"/>
Send UDP frame when this character is received: (Enter NA to disable)	<input type="text" value="NA"/>	<input type="text" value="NA"/>
<input type="button" value="Submit New Settings"/>		

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Figure 8 Terminal Server UDP Page

- » Click Serial link
- » Configure Port1 for RS422

The screenshot shows the 'Comnet Terminal Server' interface with the 'Serial' tab selected in the left sidebar. The main area is divided into three columns: 'Serial', 'Port0', and 'Port1'. The 'Serial' column contains settings for data port, baud rate, data bits, parity, stop bits, flow control, and AT commands. The 'Port0' and 'Port1' columns have corresponding dropdown menus and input fields for these settings. A 'Submit New Settings' button is at the bottom.

Serial	Port0	Port1
Data Port Settings:	<input type="text" value="DEBUG"/>	<input type="text" value="RS-422"/>
Data Baud Rate:	<input type="text" value="115200"/>	<input type="text" value="115200"/>
Custom Baud Rate:	<input type="text" value="0"/>	<input type="text" value="0"/>
Data Bits:	<input type="text" value="8"/>	<input type="text" value="8"/>
Data Parity:	<input type="text" value="None"/>	<input type="text" value="None"/>
Stop Bits:	<input type="text" value="1"/>	<input type="text" value="1"/>
Flow Control:	<input type="text" value="None"/>	<input type="text" value="None"/>
AT Commands:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="button" value="Submit New Settings"/>		

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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:

Version:

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="192.168.10.254"/>		
DNS Server: <input type="text" value="0.0.0.0"/>		
NTP Server: <input type="text" value="pool.ntp.org"/>	<input type="text" value="0.0.0.0"/>	No DNS to look up NTP server
System Time: No valid time UTC (When page was loaded)		

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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

**comnet** Comnet Terminal Server

**UDP**

UDP	Port0	Port1
Settings:		
Incoming port:	<input type="text"/>	<input type="text" value="25"/>
Outgoing port:	<input type="text"/>	<input type="text" value="24"/>
Send output to this address:	<input type="text"/>	<input type="text" value="192.168.10.1"/>
Learn outbound address from last incoming packet	<input type="checkbox"/>	<input type="checkbox"/>
Number of characters to accumulate before sending UDP 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"/>
Send UDP frame when this character is received: (Enter NA to disable)	<input type="text" value="NA"/>	<input type="text" value="NA"/>

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Figure 11 Terminal Client UDP Page

- » Click Serial link
- » Configure Port1 for RS422

Serial	Port0	Port1
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 type="checkbox"/>	<input type="checkbox"/>

Submit New Settings

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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.

The screenshot displays the 'Comnet Terminal server' configuration interface. On the left is a navigation menu with options: Network, UDP, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The 'Network' tab is selected. The main content area is titled 'Comnet Terminal server' and contains the following fields and sections:

- Protocol:** A dropdown menu set to 'TCP/SSL' with a note: '(Changing will terminate all existing connections)'.
- Device Name (for DHCP):** Text box containing 'SB70LCSX-6B52'.
- NetBIOS Name:** Text box containing 'SB70LCSX-6B52'.
- Version:** Text box containing '02.07.0000'.
- Static Settings:** A section with four text boxes:
  - Device IP Address:** 192.168.10.1
  - Device Subnet Mask:** 255.255.255.0
  - Device Gateway:** 192.168.10.254
  - DNS Server:** 0.0.0.0
- DHCP Assigned Values:** A section with two text boxes:
  - NTP Server:** pool.ntp.org
  - System Time:** No valid time UTC (When page was loaded)
- Address Mode:** A dropdown menu set to 'Static IP'.
- Additional Info:** Below the NTP Server field, it says '0.0.0.0' and 'No DNS to look up NTP server'.

At the bottom of the configuration area are two buttons: 'Reset To Factory Defaults' and 'Submit New Settings'.

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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"

	Port0	Port1
<b>Listen for incoming network connections</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Listening network port:	0	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	Never
Connect on network port:		1000
Connect to this address:		192.168.10.2
Alternate 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 checked="" 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>		
<a href="#">Submit New Settings</a>		

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*Figure 14 Terminal Server TCP Page*

- » Click Serial link
- » Configure Port1 for RS422

**comnet** Comnet Terminal Server

Serial	Port0	Port1
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](#)

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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 <span style="color: red;">Display Public Key</span>
Certificate File to Install	<a href="#">Choose File</a> device.crt
Key File to Install	<a href="#">Choose File</a> device.key

[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.

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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.

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"

Figure 18 Terminal Client TCP Page

- » Click Serial link
- » Configure Port1 for RS422

**comnet**

Comnet Terminal Server

Serial	Port0	Port1
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 type="checkbox"/>	<input type="checkbox"/>

Submit New Settings

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Figure 19 Terminal Client Serial Page

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

**comnet**

Comnet Terminal Server

CN Name	Public Key Link	Delete
	Show PublicKey	Delete

Certificate File to Install  CA.crt

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

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Figure 20 Terminal Client Certificate Authority certificate file

- » Select Add New client CA

The screenshot displays the Comnet Terminal Server web interface. On the left is a vertical navigation menu with the following items: Network, TCP, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The main content area is titled 'Comnet Terminal Server' and contains a table with three columns: 'CN Name', 'Public Key Link', and 'Delete'. The table has one row with a blank 'CN Name' field, a 'Show PublicKey' link in the 'Public Key Link' column, and a 'Delete' link in the 'Delete' column. Below the table, there is a section titled 'Certificate File to Install' with a 'Choose File' button, the text 'No file chosen', and an 'Add New client CA' button. A note below this section states: 'Key size must be at least 128 and no more than 1024 and in openssl(openSSH) format.' At the bottom of the page, a copyright notice reads: 'Copyright © 2014 Comnet, LLC.'

CN Name	Public Key Link	Delete
	Show PublicKey	Delete

Certificate File to Install  No file chosen

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

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*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.

The screenshot shows the 'Comnet Terminal server' web interface. On the left is a navigation menu with links: Network, SSH, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The 'Network' tab is selected. The main content area is titled 'Comnet Terminal server' and contains a 'Network' configuration section. This section includes a 'Protocol' dropdown set to 'SSH' with a note '(Changing will terminate all existing connections)'. Below this are fields for 'Device Name (for DHCP)' (SB70LCSX-6B52), 'NetBIOS Name' (SB70LCSX-6B52), and 'Version' (02.07.0000). A table-like structure follows with three columns: 'Static Settings', 'DHCP Assigned Values', and 'Address Mode'. The 'Static Settings' column contains fields for 'Device IP Address' (192.168.10.1), 'Device Subnet Mask' (255.255.255.0), 'Device Gateway' (192.168.10.254), 'DNS Server' (0.0.0.0), 'NTP Server' (pool.ntp.org), and 'System Time' (No valid time UTC (When page was loaded)). The 'DHCP Assigned Values' column shows '0.0.0.0'. The 'Address Mode' column has a 'Static IP' dropdown and a note 'No DNS to look up NTP server'. At the bottom of the form are two buttons: 'Reset To Factory Defaults' and 'Submit New Settings'. A copyright notice 'Copyright © 2014 Comnet, LLC.' is at the very bottom.

Figure 25 Terminal Server Network Page

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

**comnet** Comnet Terminal Server

SSH	Port0	Port1
<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>		
<a href="#">Network Settings on Serial Port - Advanced Serial Settings</a>		
<input type="button" value="Submit New Settings"/>		

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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									
<table border="0"> <tr> <td>RSA Public/Private Key Pair</td> <td>User Installed</td> <td><a href="#">Display Public Key</a></td> </tr> <tr> <td>DSA Public/Private Key Pair</td> <td>Default</td> <td><a href="#">Display Public Key</a></td> </tr> <tr> <td>RSA or DSA Key File to Install</td> <td><input type="button" value="Choose File"/> id_rsa</td> <td></td> </tr> </table>	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="button" value="Choose File"/> id_rsa	
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="button" value="Choose File"/> id_rsa								
<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.

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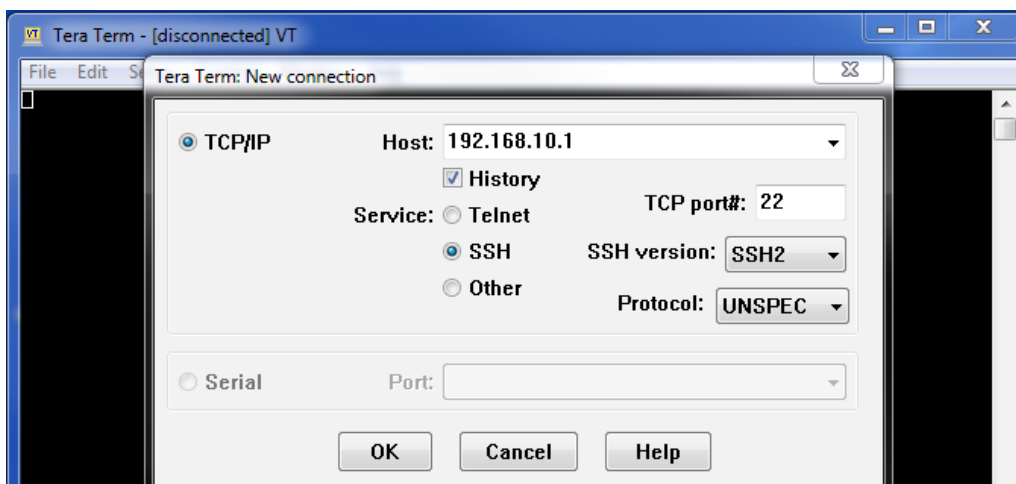
Figure 27 Terminal Server Keys Page

- » 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

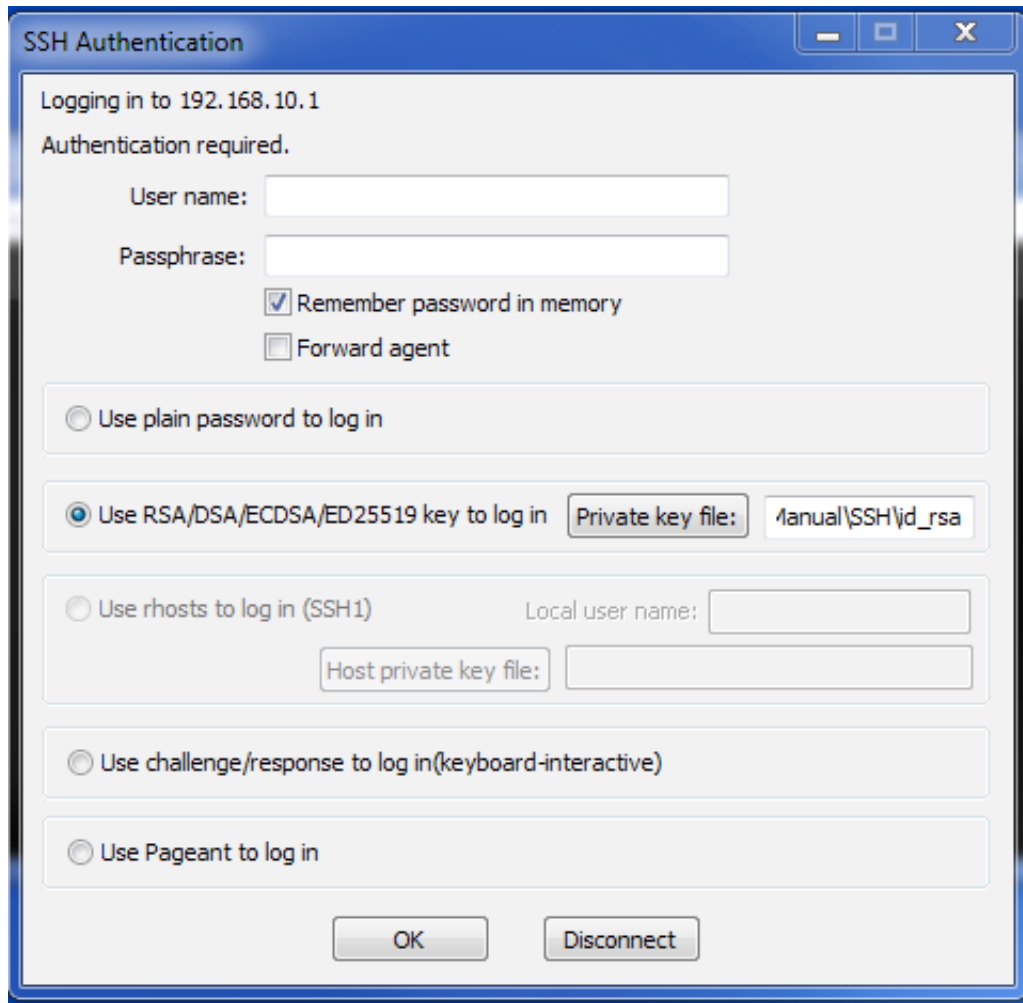


Figure 30 Terminal Client Tera Term SSH Authentication

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

Device Name (for DHCP): SB70LCSX-6B52

NetBIOS Name: SB70LCSX-6B52

Version: 02.07.0000

**Static Settings**

Device IP Address: 192.168.10.1

Device Subnet Mask: 255.255.255.0

Device Gateway: 192.168.10.254

DNS Server: 0.0.0.0

NTP Server: pool.ntp.org

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

**DHCP Assigned Values**

**Address Mode**: Static IP


0.0.0.0 No DNS to look up NTP server

Reset To Factory Defaults Submit New Settings

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Figure 32 Terminal Server Network Page

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



Comnet Terminal Server

Network	TCP	Port0	Port1
TCP			
Serial			
Password			
HTTPS			
CAcerts			
Advanced			
Help			
	<div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Listen for incoming network connections</b></p> <div style="display: flex; justify-content: space-between;"> <div> <p>Listening network port:</p> <input type="text" value="0"/> </div> <div> <p>Listening network port:</p> <input type="text" value="24"/> </div> </div> <p>Timeout and disconnect after this many seconds of inactivity.</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="60"/> <input type="text" value="60"/> </div> <p>Allow new connection if the existing connection has been idle for this many seconds.</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="30"/> <input type="text" value="30"/> </div> <p><b>When to begin making outgoing tcp connections:</b></p> <div style="display: flex; justify-content: space-between;"> <div> <input type="text" value="Never"/> </div> <div> <input type="text" value="Never"/> </div> </div> <p>Connect on network port:</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="1000"/> <input type="text" value="1000"/> </div> <p>Connect to this address:</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="192.168.10.4"/> <input type="text" value="192.168.10.2"/> </div> <p>Alternate address:</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="(Enter IP Address)"/> <input type="text" value="192.168.10.2"/> </div> <p>Timeout and disconnect after this many seconds of inactivity.</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="60"/> <input type="text" value="60"/> </div> <p>Retry failed outgoing connections after this many seconds.</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="360"/> <input type="text" value="360"/> </div> <p>Check and maintain valid connection at intervals in seconds.</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="0"/> <input type="text" value="0"/> </div> <p><b>Use custom packetization logic (below)</b></p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> <input type="checkbox"/> </div> <p>Number of characters to accumulate before sending TCP packet:</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="32"/> <input type="text" value="32"/> </div> <p>Number of msec to wait for accumulated characters: 0 waits forever.</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="100"/> <input type="text" value="100"/> </div> <p>Flush TCP frame when this character is received (Enter NA to disable):</p> <div style="display: flex; justify-content: space-between;"> <input type="text" value="NA"/> <input type="text" value="NA"/> </div> <p>USE SSL rather than TCP for connections:</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> <input type="checkbox"/> </div> <p>Always Save Serial Chars regardless of connection status:</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> <input type="checkbox"/> </div> <p><b>Network Settings on Serial Port -</b> <b>Advanced Serial Settings</b></p> <div style="text-align: center; margin-top: 10px;"> <input type="button" value="Submit New Settings"/> </div> </div>		

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Figure 33 Terminal Server TCP Page

- » Click Serial link
- » Configure Port1 for RS422

The screenshot shows the 'Comnet Terminal Server' web interface. On the left is a navigation menu with options: Network, TCP, Serial, Password, HTTPS, CAcerts, Advanced, and Help. The 'Serial' option is selected. The main area is titled 'Serial' and contains configuration settings for two ports, Port0 and Port1. The settings include Data Port Settings, Data Baud Rate, Custom Baud Rate, Data Bits, Data Parity, Stop Bits, Flow Control, and AT Commands. A 'Submit New Settings' button is at the bottom. The footer indicates 'Copyright © 2014 Comnet, LLC.'

Serial	Port0	Port1
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"/>

*Figure 34 Terminal Server Serial Page*

## Configure Client Laptop

- » Open Tera Term and select Telnet and TCP port 24

The screenshot shows the 'Tera Term: New connection' dialog box. The 'TCP/IP' radio button is selected. The 'Host' field contains '192.168.10.1'. The 'History' checkbox is checked. The 'Service' section has 'Telnet' selected, with 'SSH' and 'Other' as options. The 'TCP port#' field contains '24'. The 'SSH version' dropdown is set to 'SSH2'. The 'Protocol' dropdown is set to 'UNSPEC'. The 'Serial' radio button is unselected, and its 'Port' field is empty. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

*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

The screenshot shows the Comnet Terminal Server configuration page for HTTPS. On the left is a sidebar with a menu: Network, TCP, Serial, Password, HTTPS (selected), CAcerts, Advanced, and Help. The main content area is titled 'HTTPS' and shows the status of various components: 'SSL Public Key Certificate' is 'User Installed', 'RSA Public/Private Key Pair' is 'User Installed' with a red 'Display Public Key' link, 'Certificate File to Install' is 'device.crt' (selected via 'Choose File'), and 'Key File to Install' is 'device.key' (selected via 'Choose File'). At the bottom of this section is an 'Install Certificate and Key' button. Below the configuration area, there is explanatory text: 'HTTPS - Hypertext Transfer Protocol over Secure Shell Layer (HTTPS) secure web site settings.' and 'Key size must be at least 128 and no more than 1024 and in openssl(openSSH) format.' The footer of the page reads 'Copyright © 2014 Comnet, LLC.'

Figure 36 Terminal Server Certificate and Key files

## Internet Explorer Configuration

» Click on tools and select Internet options

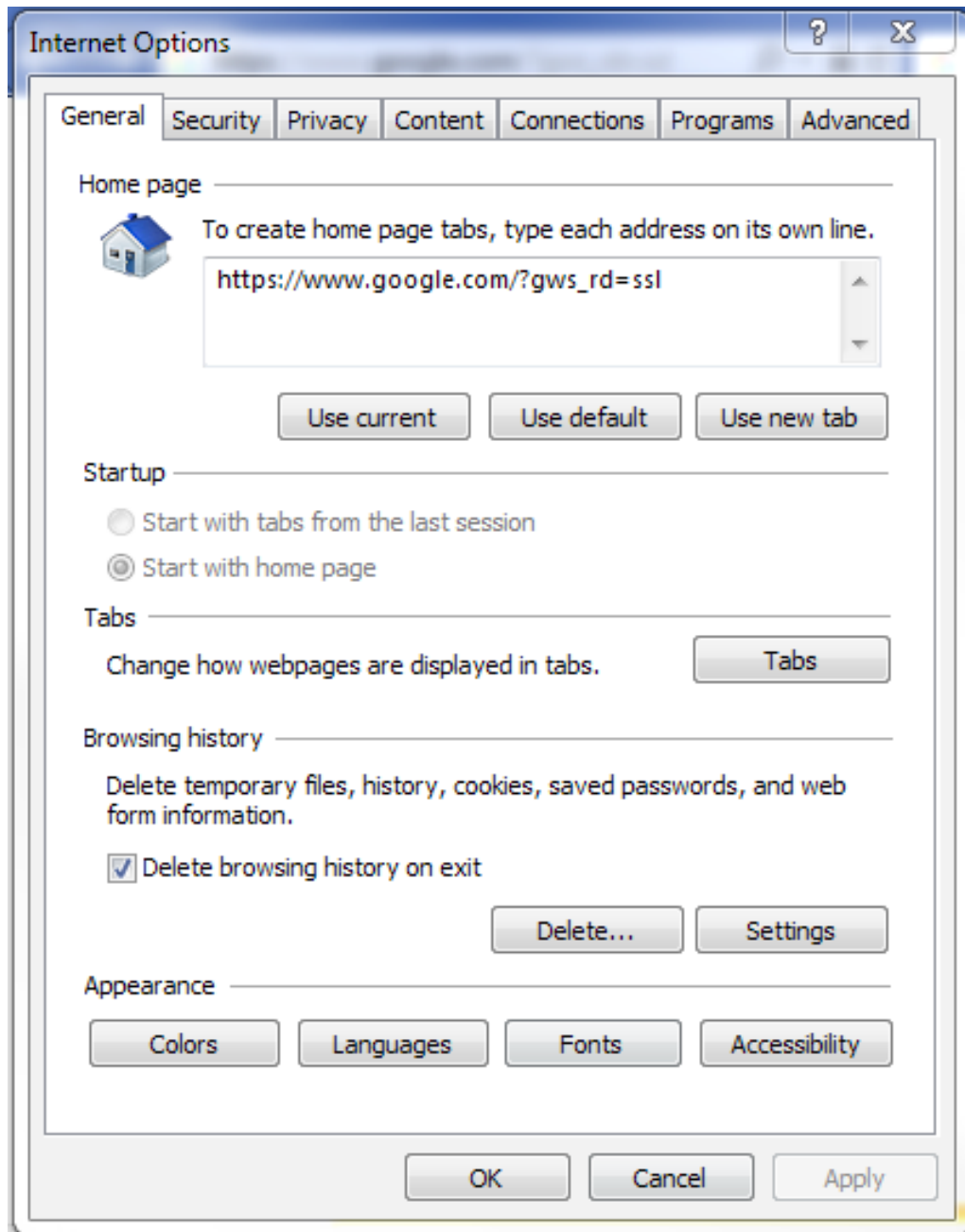


Figure 37 Terminal Client IE Options

» Click Content tab and click Certificates

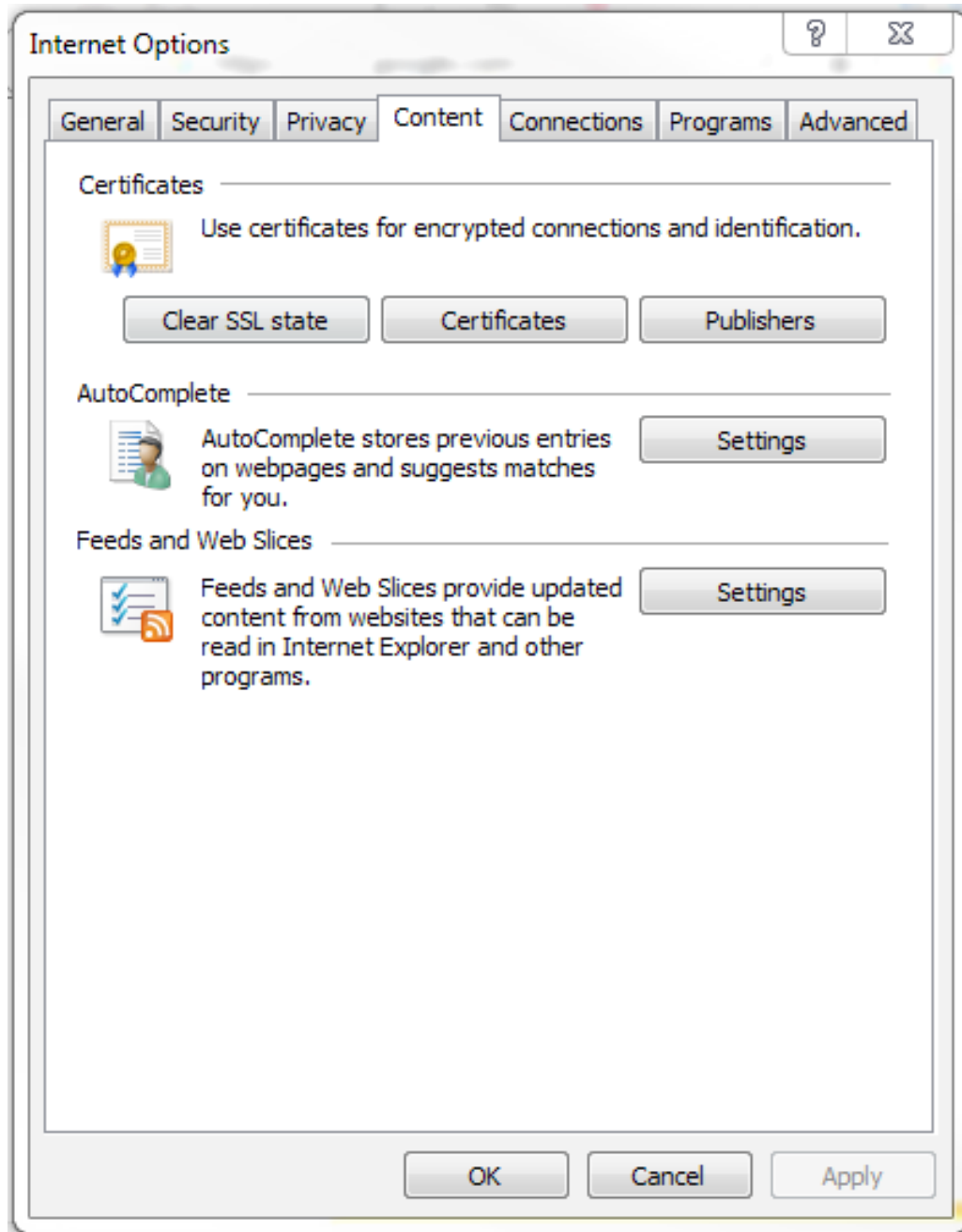


Figure 38 Terminal Client IE Certificates

» Click Trusted Root Certifications Authority tab

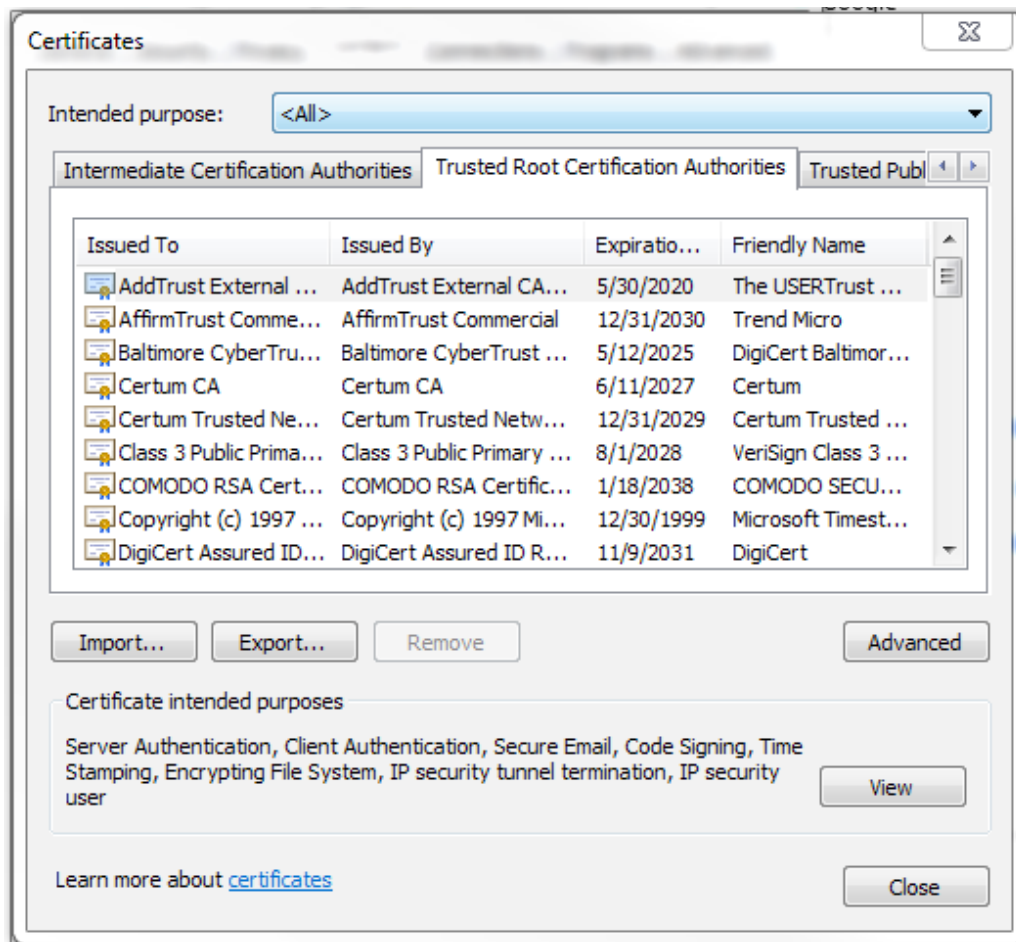


Figure 39 Terminal Client IE Root CA

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

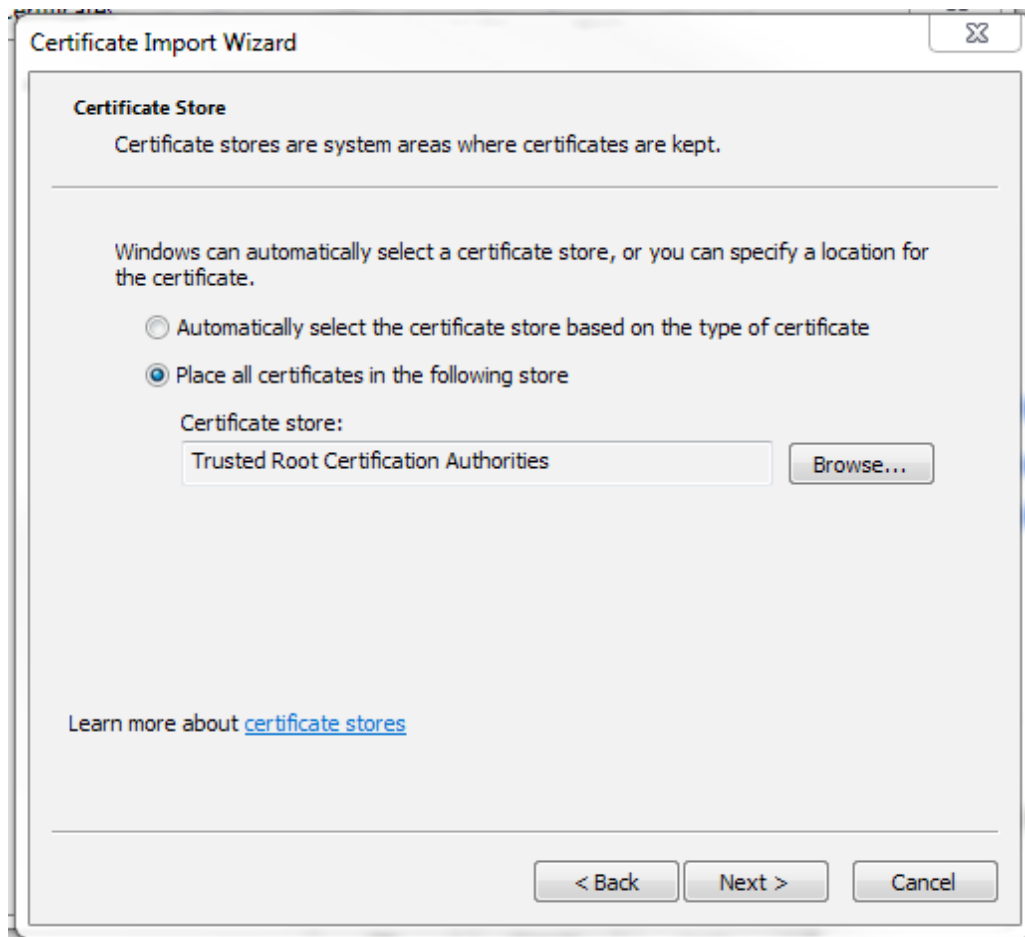


Figure 40 Terminal Client IE Certificate Store

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

## FireFox Configuration

» Click on tools and select options

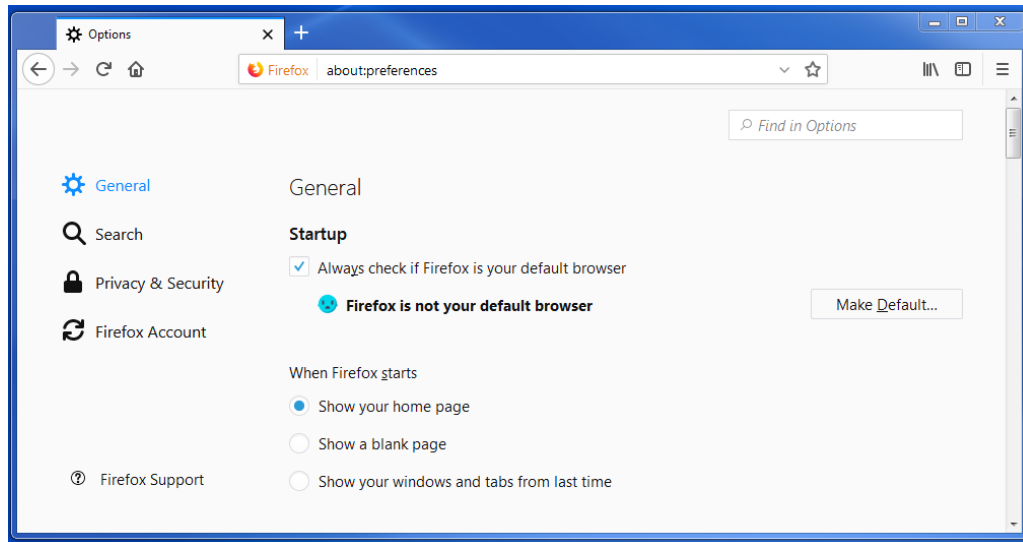


Figure 41 Terminal Client FireFox Options

» Click Privacy & Security

» Click View Certificates

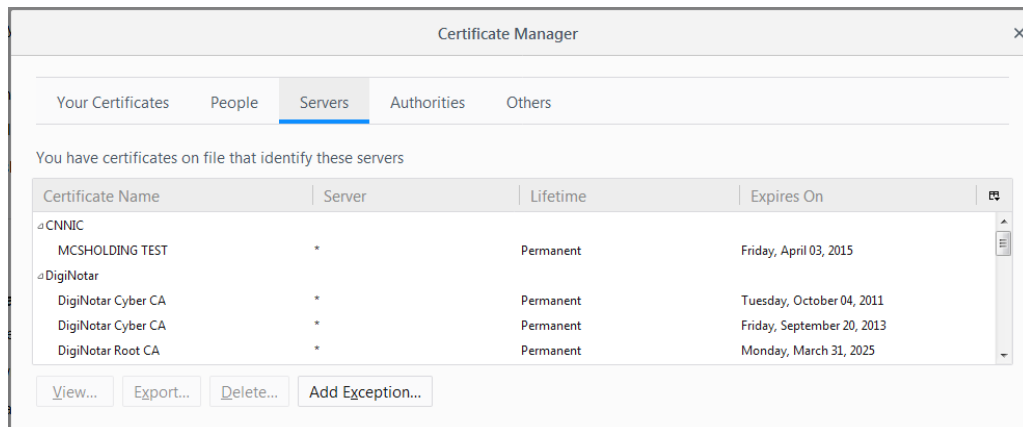


Figure 42 Terminal Client FireFox Certificate MGR

» Click Servers and Add Exception

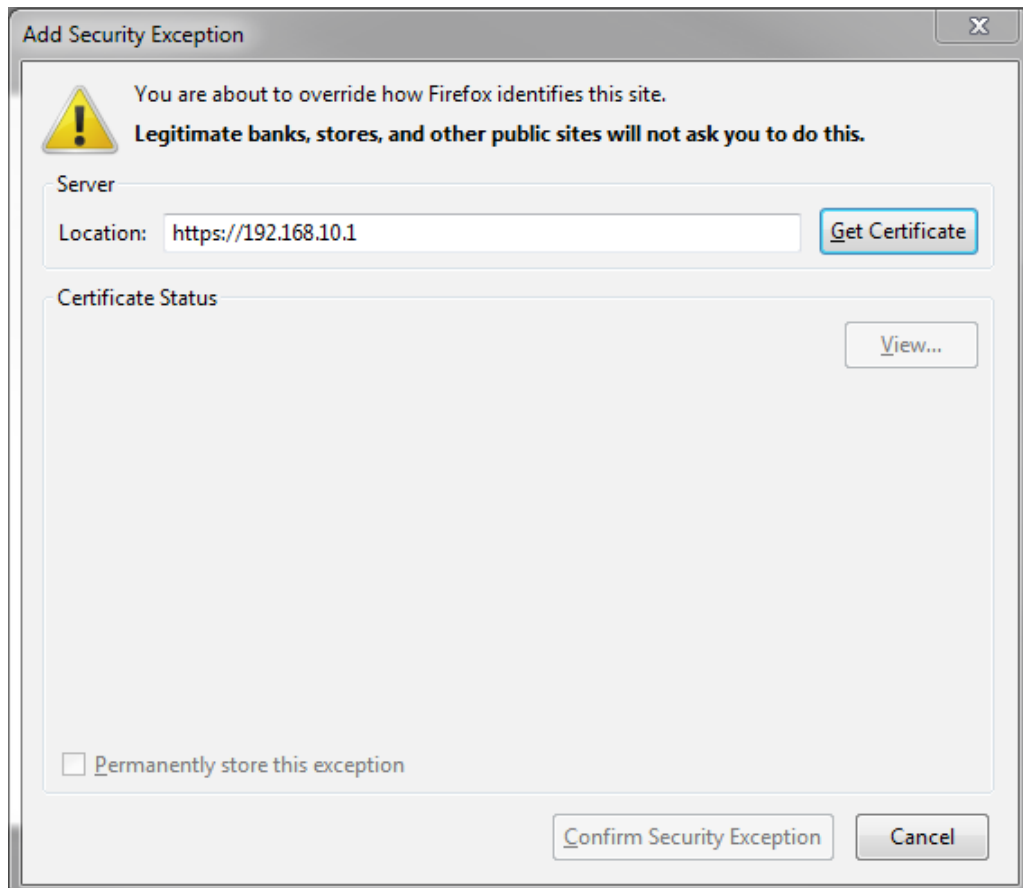


Figure 43 Terminal Client FireFox Exception

- » 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

The screenshot displays the 'Comnet Terminal Server' configuration interface. On the left is a sidebar with navigation links: Network, TCP, Serial (highlighted), Password, HTTPS, CAcerts, Advanced, and Help. The main content area is titled 'Serial' and contains configuration options for two ports, Port0 and Port1. The settings for both ports are identical: Data Port Settings is set to 'DEBUG', Data Baud Rate is '115200', Custom Baud Rate is '0', Data Bits is '8', Data Parity is 'None', Stop Bits is '1', Flow Control is 'None', and AT Commands are checked. A 'Submit New Settings' button is located at the bottom of the configuration table. The footer of the page indicates 'Copyright © 2014 Comnet, LLC.'

Serial	Port0	Port1
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

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Figure 44 Terminal Server Serial Page



## 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.

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