

InDTU332G

Guidance of typical solutions

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InHand Networks www.InHandNetworks.com

Preface

Thanks for choosing InDTU332G series industrial products! This article will introduce the usage in typical soultions.

Readers

This manual is mainly intended for the following engineers:

- Network planner
- Field technical support
- Network administrators

Conventions

This manual uses the following conventions:

Conventions	Indication
Bold	Window name, menu name and button name are in bold characters. For
Characters	example, the pop-up window New User .
>	A multi-level menu is separated by the double brackets ">". For example, the
	multi-level menu File > New > Folder indicates the menu item Folder under the
	sub-menu New, which is under the menu File.

Symbols

The meanings of the symbols are as follows:



Means reader be careful. Improper action may result in loss of data or device damage.



Notes contain detailed descriptions and helpful suggestions.

Technical Support

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1. Overview

For InDTU332G, the typical network topology is shown as below.



Figure 1-1 network topology

Under the above topologry, the DTU will work in different role/mode to meet the different soultions. The below working mode of DTU will be introduced in this article.

- Transparent transfer
- TCP server
- Modbus-Net-Bridge
- 101-to-104
- "Troy" mode
- "55 AA"command

2. Working mode and Examples

The below tools will be used to simulate the communiction node(PLC or center), the below table gives a brief introduction for these tools.

ΤοοΙ	Publisher	Function	
DTUTool.exe	InHandNetworks	Configure the InHand DTU modem.	
sscom.exe		A professional communication software	
		for serial port	
ModScan32.exe		Simulate the Modbus slave device.	
ModSim32.exe		Simulate the Modbus master device.	
Mod_RSim.exe		Simulate the Modbus master device.	
TCPUDP		Simulate the client or server for TCP/UDP.	
Debug.exe			
TCP client server		Simulate the client or server for TCP	

Tab 2-1 Tools list

2.1. Configuring Network Connection

Connect serial port 1 to the PC through a serial cable and power on the device. Step 1: Launch and log in to the DTU configuration tool. Launch the configuration tool on the PC. Click <Connect>. In the pop-up dialog box, enter the user name and password (initial user name and password are adm/123456). Select a serial port, set the serial port parameters such as baud rate, and click <Connect>, as shown in Figure 2-1.

	InDTU Configuration Tool	- ×
Status	All configurations / CPRS Go to upper dire	story
Configuration Maintenance	Connect to InDTU	^
Tools Help	User-name Connect via serial port Connect via blue-tooth	
	Password	
	Forgot password? Property 8 • None • 1 •	
	Automatic 2	
	3	~
1	Note: Please connect the serial port or blue-tooth adapter before using this application. Cancel Connect	
Connect ↔	Advanced . Export to file Import from file Save configurations Read conifgur	ations

Figure 2-2 Login configuration tool

After a successful login, the device automatically reads the DTU parameters, and then sets the parameters.

Step 2: Set the local serial port parameters. Ensure that the local serial port parameters are the same as the serial port parameters on the device connected to InDTU.

]	InDTU Configuration Tool	- >
Status Configurations	All configurations / Seri	al port 1	Go to upper directory
Maintenance	Baud rate	9600	•
Tools	Data bit	8	•
Help	Stop bit	1	•
	Parity	None	•
	Scan interval	2	100 ms
	Response timeout	5	S
	Max frame size	1024	bytes
	Flow control	Off	•
			v
Disconnect 🥝	Advanced . Export	to file Import from file	Save configurations Read conifgurations

Figure 2-3 Setting local serial port parameters



When the device functions as a client, set the local serial port parameters. When the device functions as a server, set local serial port 2 parameters.

Step 3: Click Configuration>>GPRS to modify parameter settings. For example, modify the Auto dial function, as shown in Figure 2-3. The default parameters are the public network dialing parameters. Do not modify the default parameter settings unless you are using a private network. For the private network, modify the APN, and user name/password for GPRS dialing.

		InDTU Configuration Too	1	- ×
Status Configurations	All configurations / GPR	S		Go to upper directory
Maintenance	Auto dial	Yes	•	
Tools	GPRS dial number	*99***1#		
Help	APN	cmnet		
	APN user name	GPRS		
	APN password	GPRS		
	PPP echo interval	50		s
	Redial interval	60		s
	Max redial times	3		
	Authentication mode	Auto	•	~
Disconnect 🥝	Advanced _ Expor	t to file Import from file	Save configurations	Read conifgurations

Figure 2-4 GPRS dialing parameters

Step 3: After the parameters are set, click <Save configurations>. The parameter settings take effect after a restart.

🔊 Note

1. After a login, you can start to modify parameters only when the system prompts that the configuration is successfully read.

2. After setting parameters, click **Save configurations** and restart the device. The parameter settings take effect after a restart.

2.2. Transparent TCP

The data of serial interface 1 will be pack as IP format(TCP or UDP), and sent to predefined application center. We use the TCP procotrol in this example.

2.2.1. Parameter Settings

Step 1: See chapter 2.1 Configuring Network Connection.

Step 2: Click Application center. Set Application center link mode (TCP), as shown in Figure 2-4.

	Inl	DTU Configu	uration Tool		-
Status	All configurations / Application of	center			Go to upper directory
Configurations	DTU ID				
Tools	Application center 1		Ð		
Help	Application center link mode	ТСР		•	
	Max retransmit times	5]
	Forced DC heartbeat	Off		•]
	Application center heartbeat(min)	0)
	Application center heartbeat(s)	30			
	DNS IP1	8.8.8.8			
	DNS IP2	0.0.0]
No	te: When selected transparent UD tection must be enabled, otherwise	P protocol and DTU can not c	do not use domain letect the disconne	name, user defined hea ction of network.	rtbeat packet or ICMP
Disconnect Ø	Advanced 🔺	Export to file	Import from file	Save configurations	Read conifgurations

Figure 2-5 TCP setting 1

Step 3: Choose All configurations > Application center. Set IP, Domain, and Port (0 by default, meaning a random port of application center), as shown in Figure 2-5.



The IP and Domain are both configured for application center, the IP will be effctive only.

tatus			
onfigurations	All configurations / A	pplication center / Application center 1	Go to upper director
aintenance	IP	172.31.129.6	
ols	Domain		
þ	Port	30005	

Figure 2-6 TCP setting 2

Step 4: After the parameters are set, click <Save configurations>. The parameter settings take effect after a restart.

2.2.2. Test

Step 1: Launch "TCP client server " to create a server. Use the PC as the center. Enter the IP address and TCP port number of server and click **Listen**, as shown in Figure 2-6.

0	TCP Client Server	— — X
TCP Firew	Client Serve	Br LEARN MORE
Nsauditor Network Security Au	ditor - Scan and monitor network for y	vulnerabilities. Download Now!
TCP Client Server Interfac 172.31.129.6	IP: 172.31.129.6 Port 30005	Server Listen
Peers 💌	Close Connection Send	C Clien Shutdown
Send		
<		>

Figure 2-6 Setup TCP server

Step 2: You can see that the device is successfully connected on the **TCP Client Server** page. Enter content in the **Send** box and click **Send**, as shown in Figure 2-9. The center then sends data to the DTU.

0	TCP Cli	ent Server		_ 🗆 🗙
TCP Firev	Valls & Intrusion D	t Serve	s www.ns.	auditor.com N MORE
Nsauditor Network Security A	iditor - Scan and mo	nitor network for v	ulnerabilities.	Download Now!
TCP Client Server Interfac 172.31.129.6	IP: 172.31.129.6	Port 30005	Server	Listen
Peers 119.4.253.24-3823 💌	Close Connection	Send	C Clien	Shutdown
Send			-	
123456789				^
				_
Time:10:12:49 - New Connect	ion Detected: 119.4.	253.24-38234		<u>^</u>
<				>

Figure 2-7 TCP server connected with DTU

Step 3: Connect serial port 2(Communication interface) to the PC with a serial cable. Run a serial port tool, such as Serial Port Utility, on the PC to view the content received from the center, as shown in Figure 2-8.

Untitled - Serial Port Utility		— C) ×
File Edit View Tools Help			
] 🖹 ∞ 🕨 🚺 🖬 O; +	· — 🛅 🍪		
Serial Port Setting Port USB Serial Port(COM	UK <7><169><0>2018-8-31 10:14:4 TCPIP in pbuf len=49	:pppInput[0]:	ip 🔺
Baudrate 115200 💌 Data Bits 8 💌	<7><169><0>2018-8-31 10:14:4 TCPIP 52.80.48.255,1en=49	:Rcv IP pkt fr	'om:
Parity None 💌	<pre><7><169><0>2018-8-31 10:14:4 TCPIP 0x fcf25ad8</pre>	:tcp_input_seq	ino :
Stop Bits 1 Flow Type None	<pre><7><169><0>2018-8-31 10:14:4 APP 313233343536373839 </pre>	:App net read	9B
Receive Setting	<pre><7><169><0>2018-8-31 10:14:4 HPP 9B</pre>	App serial wr	ite
• Text • Hex	313233343536373839 <7><170><0>2018-8-31 10:14:4 TCPIP 52 80 40 255 100:20	send pkt to:	
☐ Display Send □ Display Time	<pre></pre>	:Wakeup modem. :Wakeup failed	
Send Setting	<pre><7><180><0>2018-8-31 10:14:15 TCPIP</pre>	:000Writef01:	–
C Text © Hex			Send
Loop 1000 ÷ ms			-
COM7 OPENED, 115200, 8, NONE, 1, O	FF Rx: 47,814 Bytes Tx: 0 Bytes		

Figure 2-8 Check the received data on serial port

2.3. TCP Server

When the DTU work in "TCP server" mode, the DTU will act as TCP server, and the center act as TCP client. The IP address of DTU should be accessed from center side. That's to say,

- The DTU should have a public IP address,
- Or the DTU and center locate in one virtual private dialup network(VPDN).

2.3.1. Parameter Settings

Step 1: See chapter 2.1 Configuring Network Connection.

Step 2: Click **All configurations** and set Local TCP server port, which is set to 20011 in this example, as shown in Figure 2-9.

Configurations				
Maintenance	Forced DC heartbeat	Off	•	
Tools	Application center heartbeat(min)	0		
	Application center heartbeat(s)	30		
	DNS IP1	8.8.8.8		
	DNS IP2	0.0.0.0		
	SNTP server IP	116.105.109.101		
	Exchange local serial ports	Off	•	
	Local TCP server port	20011		
	Note: If selected off, heart beat wil be be sent in the interval no matter whet	sent only after no packets received find the packets received.	or the interval; if select	ed on, heart beat w
Disconnect Ø	Common	Export to file Import from file	Save configurations	Read conifguratio

🛐 Note

The communication interface will be serial port 2 under TCP server mode.

Step 3:(optional) Choose **All configurations** > **ICMP**, and set the ICMP options. Figure 2-10 shows a configuration example. The ICMP host address must be successfully pinged in 7/24 hours.

	I	nDTU Configuration Too	1	- ×
Status Configurations	All configurations / ICMP			Go to upper directory
Maintenance	ICMP host	202.106.0.20		
Tools	Max lost packets	3		
нетр	ICMP detect interval	55		S
	Forced ICMP detect	Off		•
Disconnect 🥝	Advanced 🔺 Export	to file Import from file	Save configurations	Read conifgurations

Figure 2-10 ICMP parameters

Step 4: After the parameters are set, click **Save configurations**. The parameter settings take effect after a restart.

2.3.2. Test

Step 1:Connect the serial cable with serial port 2. Run SSCOM to monitor data value of the serial port 2.

Step 2:Click Status>Network layer to check the IP address of DTU.

	InDTU Configuration Tool					- x
Status Configurations Maintenance Tools	InDTU type: InDTU311LL07-232D-DS-LP SN: DL3111818550004 Fw version: InDTU3XX_STD_V1.5.2 Aug 22 2018 17:10:00 InDTU time: 1970-01-01 08:23:22 Synchronize time to PC				me to PC	
Help	Summary Physical layer	Network layer	Application layer	r		
	Authentication: CH Received data (bytes): LCP echo	AP authentication 6873Bytes	IP addi Sent (by	ress: data tes):	113.115.217.89 4545Bytes	
	delay: Ping echo delay:	Oms	Ping pa loss i	ncket rate:	0/200	
Disconnect 🖉	Refresh every 15 seconds			Reboot	Factory reset Read aga	ain

Figure 2-11 IP address of DTU modem

Step 3: Run the "TCP Client Server", set **IP Address** to the IP address of DTU and **Service** to pre-defined port number, shown as below.

TCP Client Server	x
TCP Client Server Firewalls & Intrusion Detection Systems	m
Nsauditor Network Security Auditor - Scan and monitor network for vulnerabilities. Over 45 net tools in one. Download N	ow!
TCP Client Server Interface: 10.5.50.97 ▼ IP: 113.115.217.89 Port: 20011 C Server Connect	
Peers: 113.115.217.89-200' Close Connection Send Client Shutdown	
Send	*
Receive Time: 10:9:11 - Received Data From Connection: 113.115.217.89-20011 0000: 31 32 33 34 35 37 31 32 33 34 35 37 123457123457	*
↓ · · · · · · · · · · · · · · · · · · ·	

Figure 2-12 Connect with TCP server

2.4. Modbus-Net-Bridge

2.4.1. Parameter Settings

Step 1: See chapter 2.1 Configuring Network Connection.

Step 2: Click **Application center**. Set **Application center link mode** (Modbus-Net -Bridge), as shown in Figure 2-13.

E
E
-
ions
t

Step 3:(optional) Choose **All configurations** > **ICMP**, and set the three ICMP options. The ICMP host address must be successfully pinged in 7/24 hours.

2.4.2. Test

Step 1:Connect the serial cable with serial port 2 Step 2:Status>Network layer to check the IP address which assigned to DTU.

	InDTU Configuration Tool				
Status Configurations Maintenance Tools	InDTU type: InDTU31 SN: DL31118 Fw version: InDTU3X InDTU time: 2018-09-	1LL07-232D-DS-LP 18550004 X_STD_V1.5.2 Aug 22 201 26 14:58:03	8 17:10:00	hronize time to PC	
Help	Summary Physica	l layer Network layer	Application layer		
	Authentication:	CHAP authentication	IP address:	211.136.69.157	
	Received data (bytes):	650028Bytes	Sent data (bytes):	1037494Bytes	
	LCP echo delay:	Oms	PPP status:	Connected	
	Ping echo delay:	Oms	Ping packet loss rate:	0/200	
Disconnect 🖉	🔲 Refresh every 15 seco	nds		Reboot Factory reset Read again	

Figure 2-14 IP address of DTU modem

Step 3: Run the mod_RSsim.exe tool, and set correct values for **Port**, **Baud rate**, **Data bits**, **Stop bits**, and **Parity**, as shown in Figure 2-15.

MODBUS RTU R5-232 PLC - 9	5imulator (port: 9600,8,N,1)		
Connected (U) : (received/ser	it) (U/U) Serv. read data.	•• <u>•</u> • <u>•</u> •••••••••••••••••••••••••••••	
Address C Hex 💿 Dec 🔅	I/O Holding Registers 💌 🕇	🖡 Fmt: decimal 💌 Pr	ot MODBUS RS-23 🔽 🔽 Clone
Address +0 +1	+2 +3 +4	+5 +6 +1	*****
40001-40010 0 0	0 0 0	0 0 0	0 0 🗖
40011-40020 0 0	0 0 0	0 0 0	0 0
40021-40030 0 0	0 0 0	0 0 0	0 0
40031-40040 0 0	S-232 MODBUS PLC Sim-ser	ver Settings 🛛 🔀	
40041-40050 0 0			
40051-40060 0 0	RS-232 Port	OK	
	Port EOM1 *		
40081-40090 0 0		Cancel	
40091-40100 0 0	Baud rate 9600	Tf won see a	o o
40101-40110 0 0	Parity	- little * next	o o
40111-40120 0 0	Tarrey None	to the COM	0 0
40121-40130 0 0	Data bits 8	 port, it is the 	0 0
40131-40140 0 0	Stop hite	current port,	0 0
40141-40150 0 0	Stop bits	ior heing used	0 0
40151-40160 0 0	RTS control Disable	▼	0 0
40161-40170 0 0	,	_	
40171-40180 0 0	-Server settings		
40101-40190 0 0			
40201-40210 0 0	Kesponsiveness 0	(U to 10 000	
40211-40220 0 0	Load register values :	at start	ů ů
40221-40230 0 0	Units are all off at a	start-up	o o
40231-40240 0 0			0 0
40241-40250 0 0	Advanced settings		0 0
40251-40260 0 0	📃 🥅 Perform MODBUS - MOSC.	AD (row/table) chec	0 0
40261-40270 0 0	Allen-Bradley master	mode	0 0
40271-40280 0 0	Cheelerum		0 0
40281-40290 0 0	US1 US1	ing the (2-	
40291-40300 0 0			
40301-40320 0 0	0 0 0	0 0 0	
40321-40330 0 0	0 0 0	0 0 0	0 0
40331-40340 0 0	ō ŏ ŏ	ō õ õ	ōŏ
40341-40350 0 0	0 <u>0</u> 0	0 0 0	0 0
40351-40360 0 0	0 0 0	0 0 0	0 0
40361-40370 0 0	0 0 0	0 0 0	0 0 🔽
100 101 102 103 104 105 108 107 108	109 10 11 12 13 14 15 16	17 18 19 20 21 22 28 1	24 25

Figure 2-15 Modbus salve connect with serial port

After the settings are complete, data transmission starts, as shown in Figure 2-16.

🎆 LODBUS I	RTU	RS-232 PLC	- s	imulator	(port:	C0∎1	9600, 8	, N, 1)			
Connected (1)	: 6	eceived/sent)	(25/2	5) Serv. re	ad data.			80	-₩	8	
Address 🔿	Hex	🖲 Dec 🛛 I/	Hold	ling Registe	rs 💌 🏶	Fmt:	decimal	• Prot	MODBUS I	RS-23 💌	Clone
Address	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	~
40001-40010	12	134	0	0	0	0	0	0	0	0	_
40011-40020	0	0	0	0	0	0	0	0	0	0	
40021-40030	0	0	0	0	0	0	0	0	0	0	
40031-40040	0	0	0	0	0	0	0	0	0	0	
40041-40050	0	0	0	0	0	0	0	0	0	0	
40051-40060	0	0	0	0	0	0	0	0	0	0	
40061-40070	0	0	0	0	0	0	0	0	0	0	
40071-40080	0	0	0	0	0	0	0	0	0	0	
40081-40090	0	0	0	0	0	0	0	0	0	0	
40091-40100	0	0	0	0	0	0	0	0	0	0	
40101-40110	0	0	0	0	0	0	0	0	0	0	
40111-40120	0	0	0	0	0	0	0	0	0	0	
40121-40130	0	0	0	0	0	0	0	0	0	0	
40131-40140	0	0	0	0	0	0	0	0	0	0	
40141-40150	0	0	0	0	0	0	0	0	0	0	
40151-40160	0	0	0	0	0	0	0	0	0	0	
40161-40170	0	0	0	0	0	0	0	0	0	0	
40171-40180	0	0	0	0	0	0	0	0	0	0	
40181-40190	0	0	0	0	0	0	0	0	0	0	
40191-40200	0	0	0	0	0	0	0	0	0	0	
40201-40210	0	0	0	0	0	0	0	0	0	0	
40211-40220	0	0	0	0	0	0	0	0	0	0	
40221-40230	0	0	0	0	0	0	0	0	0	0	
40231-40240	0	0	0	0	0	0	0	0	0	0	
40241-40250	0	0	0	0	0	0	0	0	0	0	
40251-40260	0	0	0	0	0	0	0	0	0	0	
40261-40270	0	0	0	0	0	0	0	0	0	0	
40271-40280	0	0	0	0	0	0	0	0	0	0	
40281-40290	0	0	0	0	0	0	0	0	0	0	
40291-40300	0	0	0	0	0	0	0	0	0	0	
40301-40310	0	0	0	0	0	0	0	0	0	0	~
40011 40000	•	•	•	-	•	0	0	•	•	•	
00 01 02 03	04	06 07 08 0	9 10	11 12 13 14	15 16	17 18 1	9 20 21	22 23 24	25 🔺	T	Comms
26 27 28 29	30	81 182 183 184 1	5 36 1	37 38 39 40	41 42	43 44 4	5 46 47	48 49 50	51 -		

Figure 2-16 Modbus salve simulate data value

Step 4: Run the ModScan32.exe tool, choose **Connection** > **Connect**. In the pop-up dialog box, set **IP Address** to the IP address of DTU and **Service** to 502, as shown in Figure 2-17.

ModScan32 - ModSca1		×
Eile Connection Setup View Window Help		
-ModSca1	×	
Fornection Details	x	
	es: 0	
Connect Remote TCP/IP Server	et Ctrs	
TP Address: 211 136 69 157		
Service 502		
Configuration		
Hardware Flow Control		
Band 19200		
Tord 8 Delay 10 ms after RTS before	0034H: <0> 003EH: <0> 0048H: <0> 0052H: <0> 005CH:	
Parit NONE Vait for CTS from SLa	0035H: <0> 003FH: <0> 0049H: <0> 0053H: <0> 005DH: 0036H: <0> 0040H: <0> 004AH: <0> 0054H: <0> 005EH:	
Stop I Delay 10 ms after last	0037H: <0> 0041H: <0> 004BH: <0> 0055H: <0> 005FH: 0038H: <0> 0042H: <0> 004CH: <0> 0056H: <0> 0060H:	
CHARACTER DEDDE	0039H: <0> 0043H: <0> 004DH: <0> 0057H: <0> 0061H:	
	003AH: <0> 0044H: <0> 004EH: <0> 0058H: <0> 0062H: 003EH: <0> 0045H: <0> 004FH: <0> 0059H: <0> 0063H:	
rotocol Selection	003CH: <0> 0046H: <0> 0050H: <0> 005AH: <0> 0064H:	
OK Cancel		
For Help, press F1	Polls: 0 Resps: 0	/

Figure 2-17 Modbus master connect with TCP server

After the settings are complete, ModScan32.exe starts to receive data, shown as below.

== IodScan32 - []	lodSca1]						
💼 <u>F</u> ile Connection	<u>S</u> etup <u>V</u> iew <u>W</u> indow	Help					_ & ×
		N?					
	<u>32</u> 6.4 6.4						
	Device le	1: 1					
Address: 0001	MODBUS	C Doint Type	Number o	f Polls: 82			
100		b Folint Type	Valid Slav	/e Kespon	ses: /U		
Length: 100	03: HOLDING	REGISTER	•	Re	set Ctrs		
40001 2 125	40025 2 05	× + 0049	0.5 40073	2 05	40097 - 2	0.5	
40002: < 134>	40026: < 0>	40050: <	0> 40074:		40098: <	0>	
40003: < O>	40027: < 0>	40051: <	0> 40075:	< 0>	40099: <	0>	
40004: < 0>	40028: < 0>	40052: <	0> 40076:	< 0>	40100: <	0>	
40005: < 0>	40029: < 0>	40053: <	0> 40077:				
40007: < 0>	40031: < 0>	40055: <	0> 40079:	< O>			
40008: < 0>	40032: < 0>	40056: <	0> 40080:	< 0>			
40009: < 0>	40033: < 0>	40057: <	0> 40081:	< 0>			
	40034: < 0>	40058: <	0> 40082:	< U>			
40012: < 0>	40036: < 0>	40060: <	0> 40084:	λ ΌΣ			
40013: < 0>	40037: < 0>	40061: <	0> 40085:	< 0>			
40014: < 0>	40038: < 0>	40062: <	0> 40086:	< 0>			
40015: < 0>	40039: < 0>	40063: <	0> 40087:	< U>			
40017: < 0>	40041: < 0>	40065: <	0> 40089:	< 0>			
40018: < 0>	40042: < 0>	40066: <	0> 40090:	< 0>			
40019: < 0>	40043: < 0>	40067: <	0> 40091:	< 0>			
40020 0 0>	40044. (0)	40068: <	0> 40092:	< 0>			
40022: < 0>	40046: < 0>	40070: <	0> 40094:	< 0>			
40023: < 0>	40047: < 0>	40071: <	0> 40095:	< 0>			
40024: < 0>	40048: < 0>	40072: K	0> 40096:	< U>			
For Help, press F1					Polls:	33	Resps: 70

Figure 2-18 Modbus master receive data

2.5. Setting 101-to-104

2.5.1. Parameter Settings

Step 1: See 2.1 Configuring Network Connection.

Step 2: Choose **101 parameters** > **101 to 104 protocol**, and set parameters, as shown in Figure 2-19. It is recommended to retain the default parameter settings.

		InDTU Configuration Tool		- ×
Status Configurations	All configurations / 101	parameters / 101 to 104 protoc	ol	Go to upper directory
Maintenance	101 address	1		
Tools	101 address length	1		
Help	101 ASDU length	2		
	104 ASDU length	2		
	101 COT length	2		
	104 COT length	2		
	101 IOA length	2		
	104 IOA length	3		
	101 working mode	Balanced	•	~
Disconnect 🥥	Advanced _ Expor-	t to file Import from file	Save configurations	Read conifgurations

Figure 2-19 101-to-104 setting 1

Step 3: Choose **All configurations** > **GPRS**, and set **APN**, as shown in Figure 2-29. The following figure shows an example for private network, in which the APN is in Beijing. Modify the settings according to your region.

		InDTU Configuration Too	1	- ×
Status Configurations	All configurations / GPR	S		Go to upper directory
Maintenance	Auto dial	Yes	•	
Tools	GPRS dial number	*99***1#		
neih	APN	dlfk-ddn.bj		
	APN user name	GPRS		
	APN password	GPRS		
	PPP echo interval	50		S
	Redial interval	60		S
	Max redial times	3		
	Authentication mode	Auto		~
Disconnect ⊘	Advanced . Expor	t to file Import from file	Save configurations	Read conifgurations

Figure 2-20 101-to-104 setting 2

Step 4: After the parameters are set, click Save configurations. The parameter settings take effect after a restart.

2.5.2. Setting 101 Slave Station: DTU is the 101 Master Station

1) InDTU, which functions as the 101 master station, is connected to the 101 slave station through the serial port. Therefore, the baud rates, stop bits, parities, and data bits on the 101 slave and master stations must be identical. Set the Link Transmission Procedure value (choose 101 parameters > 101 to 104 protocol) of the DTU to Balanced Transmission, which must be the same as that on the 101 slave station. Set the 101 link address length (choose 101 parameters > 101 to 104 protocol) of the DTU to 1, which also must be the same as that on the 101 slave station, as shown in Figure 2-21.

Channel Session Sector Next Step	Advanced Settings
Channel Name s101	2. 2. I
	📃 🖃 Serial Communications Configuration Set 🔺
Connection Type	FirstCharWait 0
	NumCharTimesBetweenF 4
	Win232baudRate 9600
Control Donat	Win232comPortName COM11
Serial fort	Win232numDataBits BITS_8
Serial PortCOM11 -	Win 222 and Cham Pitte PTTC 1
	Win232parity , NONE -
Baud Rate 9600	WinZ3ZportUtrMode ENABLE
	Win232portMode NONE
	Win232portRtsMode DISABLE
Link Transmission Procedure	Tin232parity
 Balanced Transmission Unbalanced Transmissic 	Specify the parity for the channel, must be
	even, odd, or none.
Address field of the link	
O Not present @ One octet O Two octets	Cancel OK
Advanced Settings	Advanced Settings

Figure 2-21 101 slave station setting 1

2) Choose **101 parameters** > **101 to 104 protocol**. Set **Link address** to be the same as the 101 link address. Set the 101 ASDU address size to 2, 101 COT size to 2, and 101 IOA size to 2, which must be the same as the settings on the 101 slave station, as shown in Figure 2-22.

🖷 Modify IEC 60870-5-101 Slave 💷 💷
Channel Session Sector Next Step
Session Name s101
Link Address 1
Common Address of ASDU size
-Cause Of Transmission (COT) size O One octet
Information Object Address (IOA) size
Advanced Settings

Figure 2-22 101 slave station setting 2

3) Choose **101 parameters** > **Other**. Set the common 101 address to be the same as the ASDU address of the 101 slave station, as shown in Figure 2-23.

🖷 Modify IEC 60870-5-101 Slave	
Channel Session Sector Next	t Step
Sector Name s101	
ASDU Address 1	÷
Cyclic Message Interval 000	÷
No Modification to Database	ce Simulator
and modification to batabase	
	Advanced Settings
	Advanced Settings

Figure 2-23 101 slave station setting 3

4) Successful connection log is shown in Figure 2-24.

Trangle MicroWorks, Inc. Protocol Test Harness		
le Open Edit Window Help		
। 🔜 💐 🛅 🌚 🔁 📍 - । ?		
▼ Errors ▼ Errors ▼ Time Stamp ▼ +++ User ▼ Target ▼ +++ User	Database Elsar Bixpl Data Link Header: I Static I Brent I Cyclic I Security Data: I Static I Brent I Cyclic I Security Not AutoScrolling Physical Man/Fos Yisible Lit000/1000	
Bevice Filter		
lear Al Set All	17:16:48.166: ### s101 - COM11 - Win232 Issue overlapped ReadFile	
3 · 🖉 🖗 x101	17:16:48.166: #### s101 - COM11 - Win232 ReadFile pending	
	17:16:48.260:> 5101 10	
	17:16:48.260:> s101 c9 D1 ca 16	
	17:16:48.260:> s101 Primary Frame - Request Status of Link 17:16:48.260: DIR(1) FRM(1) FCV(0) FCB(0) ADDR(1) 17:16:48.260: 10 c9 01 ca 16	
	17:16:48.260: < sl01	
	17:16:48.260: < a101 10 0b 01 0c 16	
	17:16:48.260: #### sl01 - COM11 - Win232 Do Write event received	
	17:16:40.260: #### sl01 - COM11 - Win232 Issue overlapped WriteFile	

Figure 2-24 Successful configuration log

2.5.3. Setting 104 Master Station: DTU Is the 104 Slave Station

1) Set **Host** to the private network IP address obtained by DTU, enter the fixed value 2404 into **Port**, and set **Local IP** to the IP address of the PC running the 104 software, as shown in Figure 2-25.

🥶 Modify IEC 60870-5-104 Master
Channel Session Sector Next Step
Channel Name m104
TCP/IP Parameters
Host 10. 130. 128. 23
Port 2404 ÷
Local IP 192.168.2.14
Message Timeouts Message Buffer
t1 15000 ÷ k 12 ÷
t2 10000 ÷ ∗ 8 ÷
Advanced Settings

Figure 2-25 104 master station setting 1

2) Set **101 parameters** > **101 to 104 protocol** > **104 COT size** to 2, which must be the same as that on the 104 master station, as shown in Figure 2-26.

B Modify IEC 60870-5-104 Mast	er 🗆 🗆 🗙
Channel Session Sector Next	. Step
Session Name m104	
-Cause Of Transmission (COT) ⊂ One octat (● Two octat) size ————
	Advanced Settings

Figure 2-26 104 master station setting 2

3) Set ASDU Address to be the same as that on the 101 slave station (choose **101 parameters** > **Other**. The common 101 address must be the same as the ASDU address of the 101 slave station), as shown in Figure 2-27.

💀 Modify IEC 608	70-5-104 Mast	er 🗆 🔍 🗙
Chennel Session	Sector Next	Step
Sector Name m1	.04	
ASDU Address	1	÷
	match with	101 slave
		Advanced Settings
]

Figure 2-27 104 master station setting 3

4) Successful connection log is shown in Figure 2-28.

tamp	□ □ Transport Databast □ □ Data Link Header: □ Stati □ □ Transport Databast □ □ Data Stati	a 🔽 Breast 🔽 Cyclis 🔽 Security a 🔽 Breast 🔽 Cyclis 🔽 Security	Clear Suppl Pants Ditplay Not AutoScrolling Pan/Pon Visible 116010/803	76 IEC 60870-5-104 Commands (m Run Options Target Add Com
e Filter	18:00:30.551:	N(R) 0		General Interrogation Command
Set All	18:00:30.551:	68 04 01 00 00 00		
104	18:00:50.644: < mi0-	Unnumbered		Counter Interrogation Command
9 = 104	18:00:50.644:	TESTER ACT		
▼1921 ■1 04	18:00:50.644:	68 04 43 00 00 00		Single Point (E_SC_NA) Comman
	18:00:50.644: ### m10-	5 - 10.130.128.23:2404 - TO	CP transmit 6 bytes	Double Point (C_DC_NA) Comm
	18:00:50.644: < m10-	68 04 43 00 00 00		
	18:00:53.265:> m10-	68 04 83 00 00 00		
	18:00:53.265:> n10-	Unnumbered		Normalized Neasurand (C_SE_N
	18:00:53.265:	TESTER CON		
	18:00:53.265:	68 04 83 00 00 00		Scaled Measurand (C_SE_NB) D
	18:01:13.358; < m10-	Unnumbered		
	18:01:13.358:	TESTER ACT		Floating Measurand (C_SE_NC)
	18:01:13.358:	68 04 43 00 00 00		
	18:01:13.358: ### m10-	9 - 10.130.128.23:2404 - To	CP transmit 6 bytes	Bisting (C_BU_KA) Command

Figure 2-28 Successful configuration log

2.6."Troy" mode

Select the "Advanced mode" in DTU Tool, Click Configurations>All configurations>Muti-center machanism, Set Max reconnect interval as "troy", then

save configuration and restart it, as shown in Figure 2-29. When the DTU work in "troy" mode. The LED "Status" and "SIM" will blink fast alternatively.

Configurations	All configurations / Multi-cen	ter mechanism	Go to upper director
faintenance	Min reconnect interval	15	S
ools	Max reconnect interval	troy	s
leip	Poll/parallel	Poll	

Figure 2-29 "Troy" mode

In "troy" mode, we can interaction with modem by AT command in serial port 1. For detail about the AT command about Siemens MC55iR3, please refer to the article which named as MC55i AT Command set. The DTU Tool still can interaction with DTU by the serial port 2.

```
[11:36:49.304] atOK//The modem response "OK" for AT[11:37:00.705] at+CSQ+CSQ: 19,7//The modem response singnal strength[11:37:14.363]at+IPR?+IPR: 115200//The modem response baud rate of serial portOK
```

[11:37:15.361]exit //exit the "troy" mode

2.6.1.Send SMS by standard AT command

[14:45:03.599]AT OK	//Test the communication with modem.
[14:45:09.589] AT+CSQ +CSQ: 31,99 OK	//The modem response singnal strength
[14:45:12.599] AT+CREG? +CREG: 0,1	
ОК	//The modem register into local celluar network.
[14:45:05.729]AT+CMGF? +CMGF: 1	//Check the SMS mode, 1means text mode.

```
[14:46:08.190]IN←◆AT+CMGS="18375794875"> Hello from standard AT<br/>> 0x1a> Ox1a+CMGS: 32<br/>OK//send SMS scucessfully, and return a mark id(0-255)
```

2.7."55AA" command

For the DTU, InHand Networks provide a serial command to driver the DTU in serail interfaces. These command have a prefix "55 AA". These command will be sent to DTU with Hex format.For the detail information, please refer to the article which named as the command interface based on DTU serial port.

The SSCOM simulate the PLC to connect with the serial interface of DTU.

2.7.1.Send SMS

Send one SMS "1324" to phone number "13219096546" from the DTU.

Figure 2-30 Send SMS by "55AA" command

ОК