UHF_Middleware

Documentation

3/25/2020 Version 1.0R7

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Introduction

UHF_Middleware helps you to save UHF tags' information which read by TS100 to Database (DB).

System Requirements

UHF_Middleware is a Windows-based program, following is the requirements:

- OS: Windows XP or later version.
- .NET Framework 4.0

Preparation

Before you start to use UHF_Middleware, you should set up TS100 with TS100 Utility as blow steps.

- 1. Open **TS100 Utility** (V1.1R2) program.
- 2. Plug in TS100 to your computer by USB.
- 3. Click [Connect] button to connect with TS100.
- 4. Select [General] tab and set up an Operating Mode.
- 5. Select [Hardware] tab / [Wi-Fi Settings] button to configure Wi-Fi settings in order to send tags' information to host via the internet.
- 6. Select [Output] tab:
 - 6.1. Set up [Data Type] to make TS100 sends different information to Middleware.
 - 6.1.1. Select "Decoded Data" in general case.
 - 6.1.2. Select *"Raw Data"* only when you need to retrieve "Remove Tag Event" and "EPC raw data".



6.2. Set [TCP Server Address] that is the IP and port used for Middleware to listen.

Tip: When you click [**Start**] *button in the* **UHF_Middleware**, *it shows which IPs* & *port are listening.* (as below)



6.3. Select [TCP Server (Wi-Fi)] to enable TS100 sends data to TCP Server.

7. Click [Update] button to save the modifications.

8. Close TS100 Utility.

Now, TS100 is ready to send tag's information to TCP Server via Wi-Fi.

Using UHF_Middleware

Open UHF_Middleware (V1.0.1.3) program.

🔄 UHF_Middleware V1.0.1.3	3_B2020031900					- 🗆 X
File						
						Auto Scroll
Time	From	Device ID	Tag State	EPC	EPC (Deactived)	EPC (Reactived)
						^
						~
						, ,
					Port 1001	Start

Configure DB parameters

1. Click [File] / [Settings] in the top left menu.

S UHF_Middleware V1.0.1.3_B2020031900		
File		
<u>S</u> ettings		
<u>E</u> xit	From	De

- 2. It shows a window as below.
 - (1) Select [Save records to Database] in order to save data to DB.
 - (2) Fill up the [Target Database] form.

Then Click [Test Connection] button to make sure the settings are correct.

- (3) Click [<a>] button to update Table Name. And select the target table in the list to store tag data.
- (4) Mapping Table Fields with Log Data:

(4.1) Click empty fields under [Log Data] column. It shows a list in the field.

Table Field ID	Log Data
DateTime	
DeviceID	DeviceID
DeviceSerialNumber	
TagStato	
EPC	~

(4.2) Select a Log Data in the list to bind to the table field.

Note: Refer to Log Data Table for more information.

- (5) Select [Save log to file] will save logs to local files.
- (6) Select [Keep alive when closing Middleware] to make the middleware been running at the background after click [X] button.
- (7) Click [Save] button to save current settings to registry.
- (8) Click [Close] button to close the setting window.

Start the service

- 1. Click [Start] button to start the process of receiving tag data.
- 2. you could view the received tag data and log:
 - (1) Enable [Auto Scroll] to see the latest record in the below grid.
 - (2) The tag data received from TS100 shows in the grid.
 - (2.1) For the records that don't save to DB, the background color is white.
 - (2.2) For the records that have saved to DB, the background is highlight.
 - (2.3) For the records that have occur errors in processing, the background color is red.
 - (3) History log. If you select [**Save log to File**], the log will be saved in the same folder of UHF_Middleware.
 - (4) Click [**Stop**] button to end the process of receiving tag data.

Log Data Table

Name	Туре	Description	
DateTime	datetime	Time of data retrieved.	
FromIPAddress	string	IP address and port of TS100.	
DeviceID	string	device id of TS100.	
DeviceSerialNumber	string	device serial number of TS100.	
TagState	byte	Enable <i>"Remove Tag Event"</i> to retrieve tags removing state. 0: Present, 1: Disappeared	
TID	string	TID of the tag.	
EPC	string	EPC of the tag. (raw data) * Retrieve the data when <i>Data Type</i> is "Raw Data" or <i>Decoded</i> <i>Data</i> contains " <i>EPC</i> "	
DeactivatedEPC	string	Deactivated EPC of the tag. * Retrieve the data when TS100 in " <i>Deactivated Mode</i> ".	
ReactivatedEPC	string	Reactivated EPC of the tag. * Retrieve the data when TS100 in <i>"Reactivated Mode"</i> .	
DecodedData	string	Decoded data of EPC. * Retrieve the data when <i>Data Type</i> is " <i>Decoded Data</i> ".	
TagSerialNumber	string	 Serial number of UPC encoding. * Retrieve the data when 1. Data Type is "Decoded Data" 2. Decoded Data contains "EAN/UPC" or "EAN/UPC + EAS" 	
Ascii	string	 EPC as ASCII. * Retrieve the data when 1. Data Type is "Decoded Data" 2. Decoded Data contains "ASCII (EPC)" 	

* The gray rows in the table means that data packets may not exist. It depends on the settings of TS100 and tags' data.

Appendix A Sample SQL Schema

Using below sample schema to create a table for testing.

```
CREATE TABLE [dbo].[TagsInfo](

[ID] [bigint] IDENTITY(1, 1) NOT NULL,

[DateTime] [datetime] NULL,

[DeviceID] [varchar](10) NULL,

[DeviceSerialNumber][varchar](20) NULL,

[TagState] [tinyint] NULL,

[TagState] [tinyint] NULL,

[EPC] [varchar](50) NULL,

[DeactivatedEPC] [varchar](50) NULL,

[ReactivatedEPC] [varchar](50) NULL,

[TID] [varchar](50) NULL,

[DataSource] [varchar](21) NULL,

[DecodedData] [varchar](256) NULL,

[TagSerialNumber] [varchar](10) NULL,

CONSTRAINT [PK_TagsInfo] PRIMARY KEY CLUSTERED

(
```

[ID] ASC)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]) ON [PRIMARY]

In the UHF_Middleware, set data binding as below.

Appendix B Install a database

Following below steps to install a database for testing.

Install SQL Server 2019 Express

- 1. Download SQL Server 2019 Express. https://go.microsoft.com/fwlink/?linkid=866658
- 2. Execute the installer.



3. Select [Basic] option.

<u>B</u> asic	<u>C</u> ustom	<u>D</u> ownload Media
Select Basic installation type to install the SQL Server Database Engine feature with default configuration.	Select Custom installation type to step through the SQL Server installation wizard and choose what you want to install. This installation type is detailed and takes longer than running the Basic install.	Download SQL Server setup files now and install them later on a machine of your choice.

4. Click [Accept] button.



5. Click [Install] button.

^{sql Server 2019} Express Edition			© – ×	
Specify SQL Server install location				
INSTALL LOCATION C:\Program Files\Microsoft SQL Server	Browse	MINIMUM 6578 MB DOWNLOJ 266 MB	FREE SPACE AD SIZE	
	Close	< <u>P</u> revious	<u>I</u> nstall 15.2002	2.4709.1

6. Wait for installing.



7. Click [Close] button.

SQL Server 2019 Express EC	lition	cfullyl		© – ×
	CONNEC	LION STRING	tabase-master/Trusted Co	
	Jerver-		labase=master, musted_cc	
SQL ADMINISTRATORS	SQL SER	VER INSTALL LOG FOLDER		
DESKTOP-AIKOTEE\test	C:\Prog	ram Files\Microsoft SQL Se	erver\150\Setup Bootstrap	\Log\2020033
FEATURES INSTALLED	INSTALL	ATION MEDIA FOLDER		
SQLENGINE	C:\SQL2	2019\Express_ENU		
VERSION	INSTALL			
15.0.2000 5 RTM	CAProo	ram Files\Microsoft SOL Se	enver\150\SSEI\Recources	
15101200015, 1111	c. (rog		civer (150 (55er (itesources	
	·@- Connect <u>N</u> ow	C <u>u</u> stomize	Install SSMS	<u>C</u> lose
				15.2002.4709.1

Install SQL Server Management Studio (SSMS)

- 1. Download SQL Server Management Studio (SSMS) https://aka.ms/ssmsfullsetup
- 2. Execute the installer. Click [Install] button.

RELEASE 18.4 Microsoft SQL Server Management	– Studio			
Welcome. Click "Install" to begin.				
Location: C:\Program Files (x86)\Microsoft SQL Server Management Studio 18 Change				
By clicking the "Install" button, I acknowledge that I accept the <u>License Ter</u> <u>Privacy Statement</u> . SQL Server Management Studio transmits information about your installation experience, a usage and performance data, to Microsoft to help improve the product. To learn more abo and privacy controls, and to turn off the collection of this information after installation, see <u>documentation</u> .	rms and is well as other ut data processing the			
<u>I</u> nstall <u>C</u> lose				

3. Wait for installing.

	release 18.4 Microsoft	SQL Server N	lanagement Studio
Package F	rogress		
Microsoft	Help Viewer 2.3		
Overall Pr	ogress		
		Cancel	

4. Click [**Restart**] button to restart your PC.

- RELEASE 18.4 Microsoft SQL Server Management Studio	
Restart required in order to complete setup.	
All specified components have been installed successfully.	
The computer needs to be restarted before setup can continue.	
Restart Close	

5. Execute SSMS.



6. Click [Connect] button.

Configure the Database

- 1. Change authentication mode with SSMS.
 - 1.1 Right click on [**Object Explorer**] / Database Node. Click [**Properties**] on pop-up menu.

💀 Microsoft S	QL Server Management Studio
File Edit Vie	w Project Tools Window Help
0-0 13	🝷 🛅 🚽 🔛 🔐 📳 New Query 💡
¥ \¥	- D Execute
Object Explorer	▼ ₽ ×
Connect - # *	¥ = ∀ ¢ ↔
🕀 🛑 Da	Connect
🕀 📕 Se	Disconnect
🕀 💼 Se	Register
	New Query
⊕ = M	Activity Monitor
⊕ ₹ XI	Start
	Stop
	Pause
	Resume
	Restart
	Policies
	Facets
	Start PowerShell
	Azure Data Studio 🔸
	Reports
	Refresh
	Properties

1.2. Select [Security] page and select [SQL Server and Windows Authentication mode]

Server Properties - DESKTOP	P-AIKOTEE\SQLEXPRESS	_	×
Select a page General	⊥ Script 👻 😯 Help		
Memory Processors Security Connections Database Settings	Server authentication O <u>W</u> indows Authentication mode		
Advanced Permissions	<u>SQL</u> Server and Windows Authentication mode Login auditing None		

- 1.3. Click [OK] button.
- 2. Enable **sa** login

2.1. Expand [**Object Explorer**] / [**Security**] / [**Logins**], right click [**sa**], and click [**Properties**] on pop-up menu.

Microsoft SQL Sen File Edit View P O - O 13 - 10	ver Management Studio roject Tools Window - 🔄 🔛 🔐 🕼 New (
¥ %	- Þ Ex
Object Explorer Connect • ¥ ¥ ■ Databases Databases Security Cogins ##MS ##MS BUILT BUILT NT AU NT SE NT SE NT SE NT SE NT SE	
	New Login Script Login as
🕃 📁 Audit 🕀 📁 Server 🕀 📁 Server Ob	Policies Facets
🕀 📕 Replicatio	Start PowerShell
⊕ ■ PolyBase ⊕ ■ Managen	Reports +
😥 🐔 XEvent Pr	Rename Delete
	Refresh
	Properties

2.2. Set Password for the account **sa** in [**General**] page.

Login Properties - sa		-		×
Select a page	🖵 Script 🔻 😯 Help			
 Server Noies User Mapping Status 	Login name:	sa	S <u>e</u> arcl	h
	Password:	•••••		
	Confirm password:	•••••		

2.3. Set Login to [Enable] in [Status] page.

Login Properties - sa	
Select a page General	🖵 Script 🔻 😮 Help
 Server Roles User Mapping Status 	Settings
J Status	Permission to connect to database engine:
	 Girant Deny
	Login:

- 2.4. Click [OK] button.
- 3. Allow 1433 port through the firewall.
 - 3.1. Execute [WF.msc]. Click [New Rule] in [Inbound Rules] page.



3.2. Select [Port] option. Then click [Next] button.



3.3. Select [Specific local ports] and enter 1433. Then click [Next] button.

Steps:			
Rule Type	Does this rule apply to TCP or UDP?		
Protocol and Ports	(e) <u>T</u> CP		
 Action 	⊖ <u>U</u> DP		
Profile			
Name	Does this rule apply to all local ports or specific local ports?		
	○ <u>A</u> II local ports		
	Specific local ports: 1433		
	Example: 80, 443, 5000-5010		

3.4. Click [Next] button.

Steps:	
a Rule Type	What action should be taken when a connection matches the specified conditions?
 Protocol and Ports Action 	Allow the connection This isolutes connection
ProfileName	Allow the connection if it is secure This includes only connections that have been authenticated by using IPsec. Connections will be secured using the settings in IPsec properties and rules in the Connection Security Rule node. Customize.
	O Block the connection

3.5. Click [Next] button.

Steps:	
a Rule Type	When does this rule apply?
Protocol and Ports	
Action	✓ Domain
Profile	Applies when a computer is connected to its corporate domain.
Name	✓ Private
	Applies when a computer is connected to a private network location, such as a home or work place.
	✓ Public
	Applies when a computer is connected to a public network location.

3.6. Enter the rule name. Then click [Finish] button.

S	teps:
۲	Rule Type
۲	Protocol and Ports
۲	Action
۲	Profile
۲	Name

4. Enable SQL Server TCP/IP connection.

- 4.1. Open [Computer Management].
- 4.2. Select [Services and Applications] / [SQL Server Configuration Manager] /

[SQL Server Network Configuration] / [Protocols for SQLEXPRESS]

🞥 Computer Management		
File Action View Help		
🗢 🔿 🔁 📰 🔯 🗟 📑 🚺		
 Computer Management (Local) System Tools Storage Services and Applications Services WMI Control SQL Server Configuration Manager SQL Server Services SQL Server Network Configuration (32bit) SQL Server Network Configuration Protocols for SQLEXPRESS SQL Native Client 11.0 Configuration 	Protocol Name Shared Memory Named Pipes	Status Enabled Disabled Disabled

4.3. Double click [TCP/IP] item. Set [Enabled] item to [Yes] in [Protocol] page.

TCP/IP Properties		?	\times
Protocol IP Addresses			
General			
Enabled	Yes		-
Keep Alive	30000		
Listen All	Yes		

- 4.4. In [IP Addresses] page:
 - 4.4.1. Enter 1433 at [TCP Port]
 - 4.4.2. Set [Enabled] to [Yes]
 - 4.4.3. Clear [TCP Dynamic Ports] value
- 4.4. Then click [OK] button.
- 4.5. Select [SQL Server Services] item.

Right click [SQL Server (SQLEXPRESS)] and click [Restart] to apply new settings.

🕌 Computer Management					
File Action View Help					
🗢 🔿 🙋 📰 🖾 🗟 🛛	TT 🖲 🖲 💌				
Ecomputer Management (Local	Name	State	Start Mode	Log On As	Prc
 System Tools Storage Services and Applications Services WMI Control SQL Server Configuratic SQL Server Services SQL Server Network 	SQL Server (SQLEXPRESS) SQL Server Agent (SQLEXPRESS)	Start Stop Pause Resume Restart Properties Help	er (Boot, Syste er (Boot, Syste	NT Service\MSSQLS NT AUTHORITY\NE NT AUTHORITY\LO	260 0 0

4.6. Double click [SQL Server Browser].

Computer Management			
<u>File Action View H</u> elp			
🗢 🄿 📶 📰 🗟 🛛 📆 🕥 🛈) 🖲 🕐		
E Computer Management (Local)	Name	State	Start Mode
> 👔 System Tools	SQL Server (SQLEXPRESS)	Running	Automatic
> 🚰 Storage	SQL Server Agent (SQLEXPRESS)	Stopped	Other (Boot, Syste
 Services and Applications 	SQL Server Browser	Stopped	Automatic
WMI Control			
SOL Server Configuration Manager			
SQL Server Services			
SQL Server Network Configuratio	r l		
> 🚊 SQL Native Client 11.0 Configura	E		
🔉 🖳 SQL Server Network Configuratio	r		
🔉 💂 SQL Native Client 11.0 Configura	t		

4.7. In [Service] page, change [Start Mode] to [Automatic]. Then click [OK] button.

SQL Server Browser Properties				?					
Log On	Service	Advanced							
🖯 Ger	neral								
Binary Path			"C:\Pr	"C:\Program Files (x86)\Microsoft S					
Error Control			1	1					
Exit	Exit Code			1077					
Hos	st Name		DESKI	DESKTOP-AIKOTEE					
Nar	ne		SQL S	erver Browser					
Pro	cess ID		0						
SQL	Service Tj	/pe							
Sta	Start Mode			Disabled 💌					
Stat	State			matic					
			Disab	Disabled					
				Manual					
Start N	Node								
The sta	art mode (of this service.							
		OK	Cancel	Apply	He	elp			

4.8. Right click [SQL Server Browser] item and click [Start].

Name	State Running	Start Mode Automatic
SQL Server Agent (SQLEX	Start	Other (Boot, Syste Automatic
	Stop Pause	
	Restart	_
	Properties Help	

Appendix C Q & A

Q1. How to clear the tag data records and log message showing in the UI?

A1.

- 1. Right-click the list, in the drop-down menu, click to select [**Clear**]. (If there is any unsaved record, then they cannot be clear.)
- 2. Double-click the Log text box to clear log message.
- 3. The log message will also be automatically clear if the record count reach to 2000.
- Q2. How to re-save the record to DB?

A2. Select one or more than one records, right-click the list view, in the drop-down menu, click [Resend].

Time	From	Device ID	EPC	EPC (Deactived)	EPC (Reactiv	ed)	TID	Decoded Type	Decoded String	Saved
2019/05/24 17:30:47	192.168.100.58:23163	FF	AAAA1234560000000000				E28011002000575A240601AA	TagData		V
2019/05/24 17:30:47	192.168.100.58:23163	FF	AAAA1234560000000000				E28011002000575A240601AA	TagData		V
2019/05/24 17:30:47	192.168.100.58:47264	FF	00007D00000000000000				E280110020003B1393EB015B	TagData		V
2019/05/24 17:30:48	192.168.100.58:47264	FF	00007D00000000000000				E28011002000594E239601AA	TagData		V
2019/05/24 17:30:48	192.168.100.58:47264	FF	00007D000000000000000				E28011002000594E239601AA	TagData		v
2019/05/24 17:30:48	192.168.100.58:47264	FF					E20034120137FB000C32762A141D01	EAN_UPC	049886185089	V
2019/05/24 17:30:48	192.168.100.58:47264	FF	00007D00000000000000			Resend	E280110020005101228801AA	TagData		V
2019/05/24 17:30:48	192.168.100.58:47264	FF	00007D00000000000000			Clear	E280110020005101228801AA	TagData		V
2019/05/24 17:30:48	192.168.100.58:47264	FF	00007D000000000000000				E280110020005B1A260501AA	TagData		V
2019/05/24 17:30:48	192.168.100.58:47264	FF	00007D000000000000000				E280110020005B1A260501AA	TagData		V
2019/05/24 17:30:49	192.168.100.58:47264	FF	00007D00000000000000				E28011002000568E23D101AA	TagData		V

Update History

25MAR2020 release

- Version 1.0R7
- Update Using UHF_Middleware.

04Dec2019 release

- Version 1.0R6
- Update Sample SQL Schema.

22Nov2019 release

- Version 1.0R5
- Update Sample SQL Schema.
- Update Log Data Table.

16AUG2019 release

- Version 1.0R4
- Update Sample SQL Schema.
- Update the content according to UHF_Middleware (V1.1R1).
- Add Log Data Table.

2JUL2019 release

- Version 1.0R3
- Update Sample SQL Schema

11JUN2019 release

- Version 1.0R2
- Add Sample SQL Schema

3JUN2019 release

• Version 1.0R1