Advantech

Advantech Energy Solutions iCDManager Software User Manual

iCDManager

**Advantech Energy Solutions**
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1. iCDManager (intelligent Connectivity Diagnose Manager) Overview

As you know, the substation communication gateway play the important roles, which communicate with the more intelligent device in the smart substation , Suppose the remote SCADA operator find that there are some communication issue with the substation gateway , which may occurred in the remotely substation , because the substation is located in the remote suburb usually , the service engineer will take the long time to get to the substation and maintain the communication issue，it will cause the high maintain cost and low efficiency。

How to help the remote SCADA operator to diagnose the communication heath issue and analyze the root cause of the communication issue ?

Advantech iCDManager will provide the intelligent connectivity diagnose solution for this requirement, the remote SCADA operator can monitor the substation gateway's communication health and guide the substation field operator to examine the physical communication link or the other software application configuration by the iCDManager service .

Advantech iCDManager is the intelligent Connectivity Diagnose Manager tools, which can monitor and diagnose the Power & Energy computers 's communication status, this tools can report the communication quality and failure for the network communication issue , it can improve diagnose efficiency and save the maintain cost in the complicated network application.
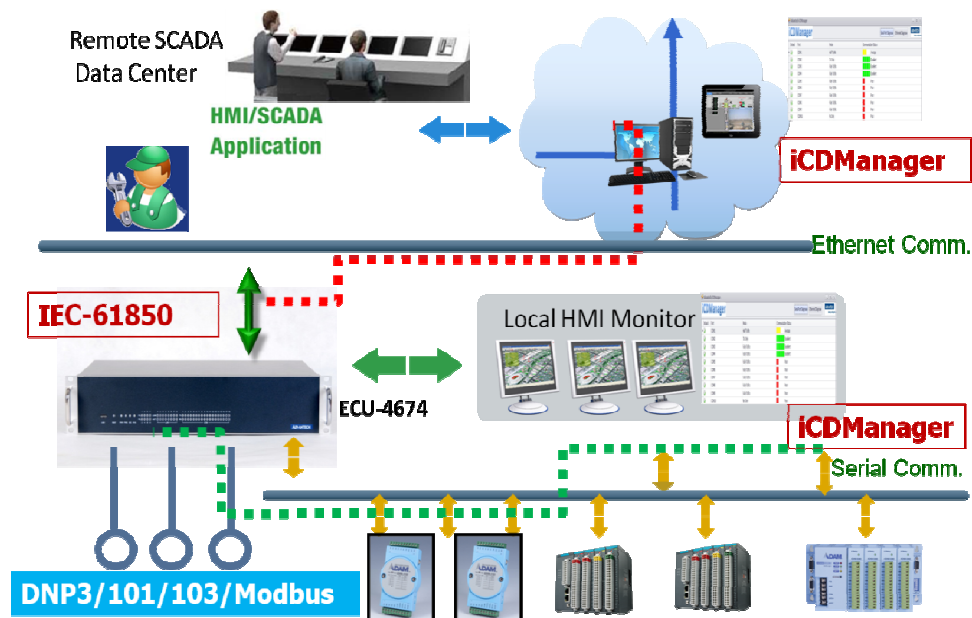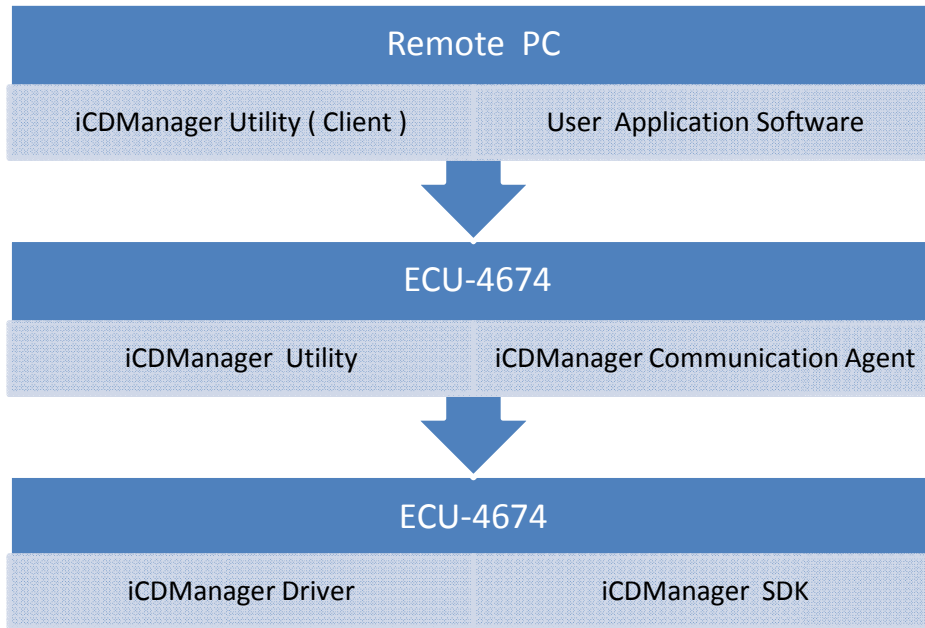

2. the system Structure diagram

Figure 1 : iCDManager software structure diagram

Figure 1 illustrate the iCDManager's   system structure and component :

（1）iCDManager SDK

The iCDManager SDK module will provide the iCDManager driver and Program API for the customer application for ECU-4674 .

（2）iCDManager Communication Agent

The communication Agent will run in the Power & Energy computers (ECU -4674 Series) , which can communicate with the remote PC 's iCDManager Application software , this Agent will transfer the communication port status to the iCDManager application software according to the iCDManager's configuration requirement . iCDManager Utility communicate with the communication Agent by TCP/IP with ECU-4674 ,   ECU Listening TCP Port is 7000，the Protocol format is defined by Advantech. it can connect the more Power & Energy computers and monitor the multi ECU Device 's communication status.

（3）iCDManager Utility

iCDManager Utility will run in the Local ECU-4674 , it can connect the more Power & Energy computers and monitor the multi ECU Device 's communication status.

（4）iCDManager Application Software

iCDManager Application Software will run in the Remote SCADA PC , which can communicate with the remote ECU-4674 's iCDManager Agent , it can connect the more Power & Energy computers and monitor the multi ECU Device 's communication status by communication with iCDManager Agent 's communication protocol。

User can configure the different communication mode and iCDManager will rate the communication quality according to the communication data transferring content .
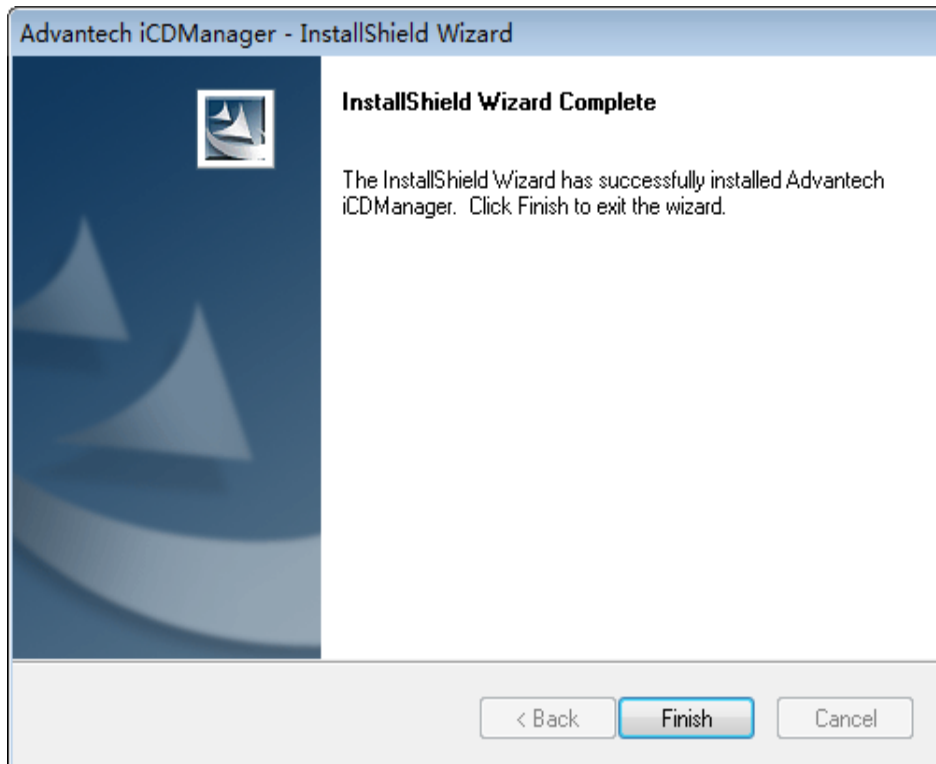
3. iCDManager Driver & SDK Installation

Installation is required. If there is no existing installation of Advantech iCDManager SDK on your computer, take the following steps to install Advantech iCDManager SDK.

How to install Advantech iCDManager SDK

Verify that your computer meets the hardware and software requirements to run Advantech iCDManager SDK. If you do not already have a copy of the installer Advantech iCDManager driver, pls. download the installer. You can run iCDManager.exe, This will install driver and SDK of iCDManager.
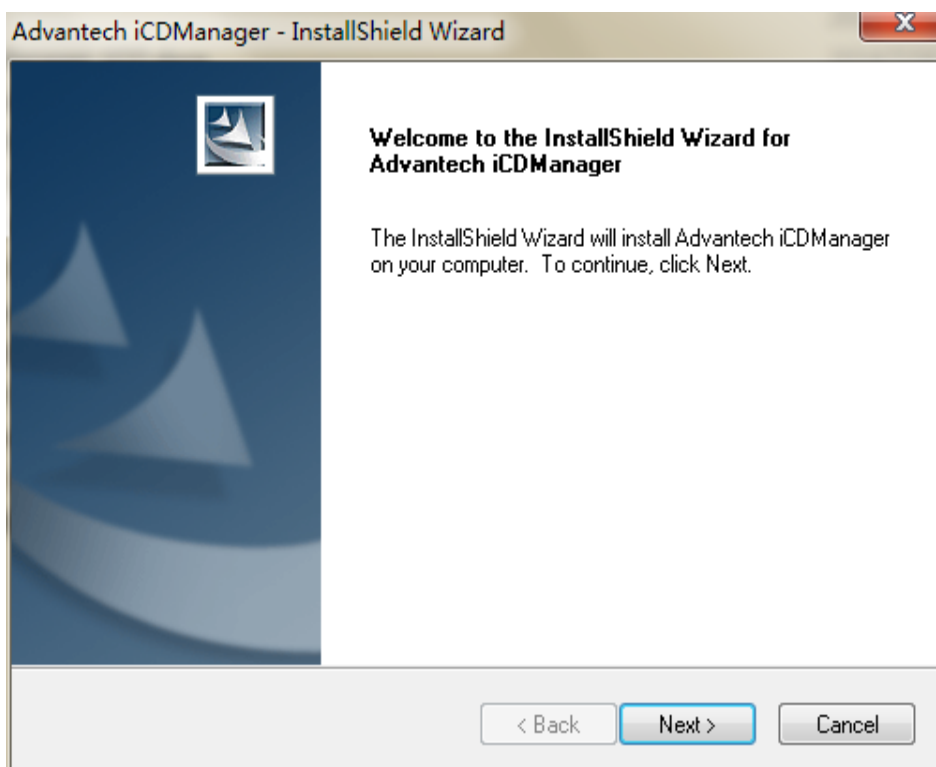
After install the iCDManager driver , you can run the iCDManager utility to monitor the Power Automation computers 's communication status in the ECU-4674 Local terminal .

4. iCDManager for Serial communication

For the serial communication, we will use the iCDManager to monitor the serial physical communication and get send and receive signal active status , including the RX Signal Elapsed interval , TX signal Elapsed interval , Response time interval .

iCDManager will configure the communication mode and get the com port rate result (Excellent & Good &Average & Poor)

User Should select the different serial communication mode configuration before they start up the diagnose the connectivity according to the actual requirement .

(1) When the serial communication mode is configured as < Fully RX/TX >, it means that the ECU-4674 are sending and receiving the data with the serial device synchronous ,there are four possible communication quality rating status as (Excellent & Good &Average & Poor) .

the parameter setting description is as below :
- Communication mode: select <Fully RX/TX>
- RX Time Span (ms): prospective normal receive time interval
- Max RX Time Span (ms): prospective receive time interval Max.
- TX Time Span(ms): prospective normal sending time interval
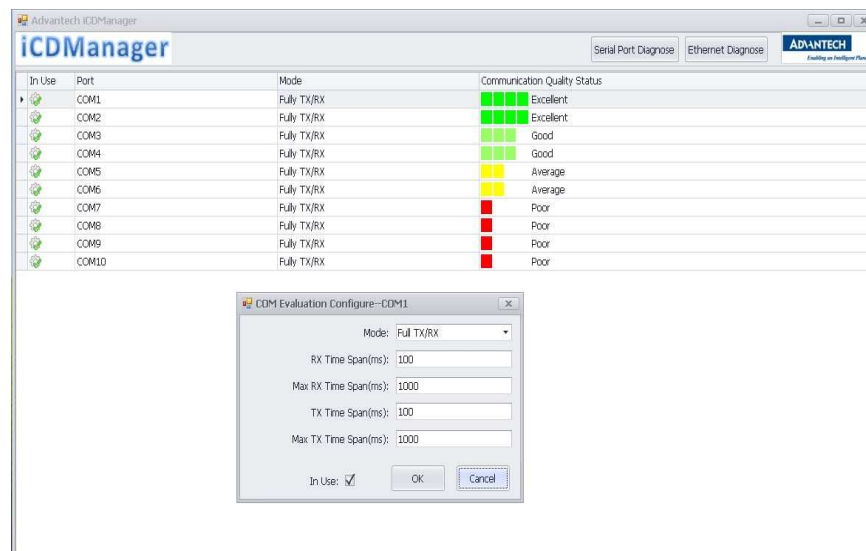- Max TX Time Span(ms): prospective sending time interval Max.

When the actual receive time interval < RX Time Span, and when the actual sending time interval < TX Time Span, the communication quality rating will be excellent .

When the actual receive time interval > Max RX Time Span, and when the actual sending time interval > Max TX Time Span, communication quality rating will be poor

For the other actual receive time interval value and the actual sending time interval value, the serial communication rating will be calculated by the internal algorithm and weight .

Parameter setting should be kept in the below range : RX Time Span >10ms, Max RX Time Span >100 ms, RX Time Span < Max RX Time Span ; TX Time Span >10ms, Max TX Time Span>100 ms, TX Time Span < Max TX Time Span .

For example: When ECU-4674 's com port 1 send the data every 10ms, the serial device on Port 2 reply the data every 10ms to ECU-4674, the communication quality rating status will be excellent.

(2) When the ECU-4674's communication mode is configured as the < Half TX /RX> , it means that the ECU-4674 will request the data to the serial device , and when the ECU-4674 received the data from the serial device , then it will send the data to the serial device , there will be four possible communication quality rating status (Excellent & Good &Average & Poor).

the parameter setting description is as below :
- Communication mode: select Half RX/TX
- TX Time out (ms): prospective normal sending time interval
- Response Time Span (ms):   prospective normal response time interval
- Max Response Time Span (ms): prospective response time interval Max.
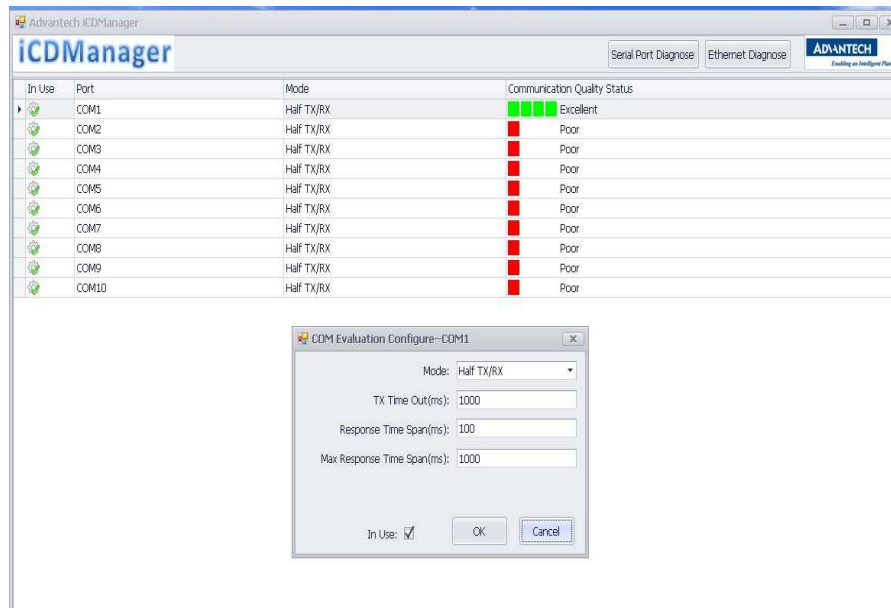
When the actual response time interval < Response Time Span, and when the actual normal sending time interval < TX Time out , the communication quality rating will be excellent .

When the actual response time interval > Max Response Time Span, the communication quality rating will be poor

For the other actual response time interval value and the actual normal sending time interval value, the serial communication quality rating will be calculated by the internal algorithm and weight .

Parameter setting should be kept in the below range :   Response Time Span >10ms, Max Response Time Span >100 ms, Response Time Span < Max Response Time Span ; TX Time out >10ms.

For example : When ECU-4674 's receive the data from the serial device every 10ms, the communication quality rating status will be Excellent .

(3) When the ECU-4674 's communication mode is configured as the< Tx only >, it means that the ECU-4674 will send the data to the serial device , and the serial device will not reply the data to the ECU-4674 , there will be four possible communication quality rating status as (Excellent & Good &Average & Poor).

the parameter setting description is as below :

● Communication mode: select <Tx only>
● TX Time Span(ms): prospective normal sending time interval
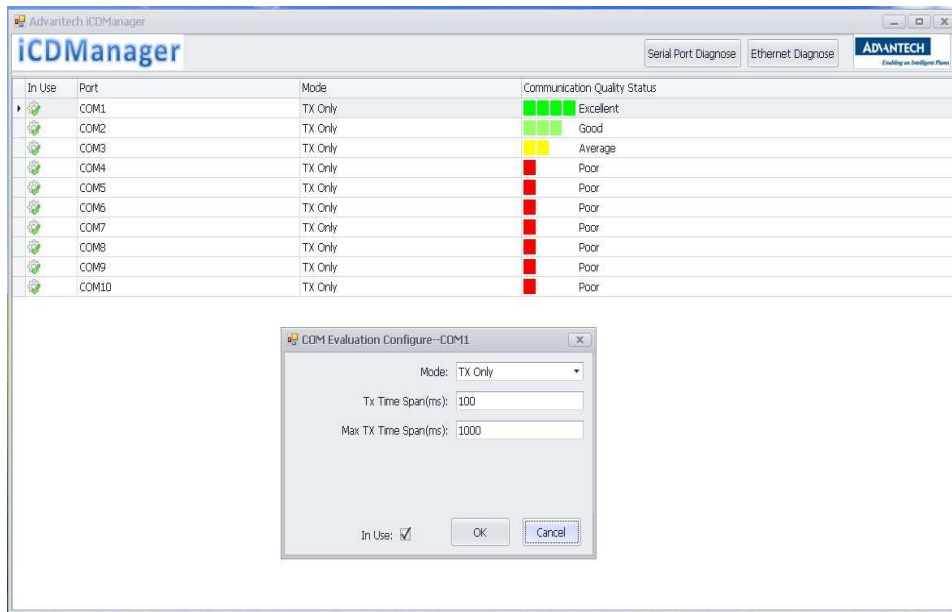● Max TX Time Span(ms): prospective sending time interval Max.

When the actual two sending time interval < TX Time Span, the communication quality rating will be excellent .

When the actual two sending time interval > Max TX Time Span, communication quality rating will be poor.

For the other actual two sending interval value , the serial communication quality rating will be calculated by the internal algorithm and weight.

Parameter setting should be kept in the below range : TX Time Span >10ms, Max TX Time Span>100 ms, TX Time Span < Max TX Time Span .

For example : When ECU-4674 's COM1 send the data to the serial device every 10ms, the communication quality rating status will be excellent

(4) When the ECU-4674's communication mode is configured   as the <RX only>   , it means
that the ECU-4674 will receive the data from the serial device and will not reply the data
to the serial device , there will be four possible communication quality rating status as
(Excellent & Good &Average & Poor) .

the parameter setting description is as below :
- Communication mode: select <RX only>
- RX Time Span (ms):   prospective normal receive time interval
- Max RX Time Span (ms): prospective receive time interval Max.

When the actual two receive time interval < RX Time Span,   the communication
quality rating will be excellent .

When the actual two receive time interval > Max RX Time Span, the communication
quality rating will be poor.

For the other actual two receive time interval value ,the serial communication quality
rating will be calculated by the internal Algorithm and Weight.

Parameter setting should be kept   in the below range : RX Time Span >10ms, Max RX
Time Span >100 ms, RX Time Span < Max RX Time Span .

For example: When ECU-4674 's COM 1 receive   the data from the serial device
every 10ms, the communication quality rating status will be Excellent .
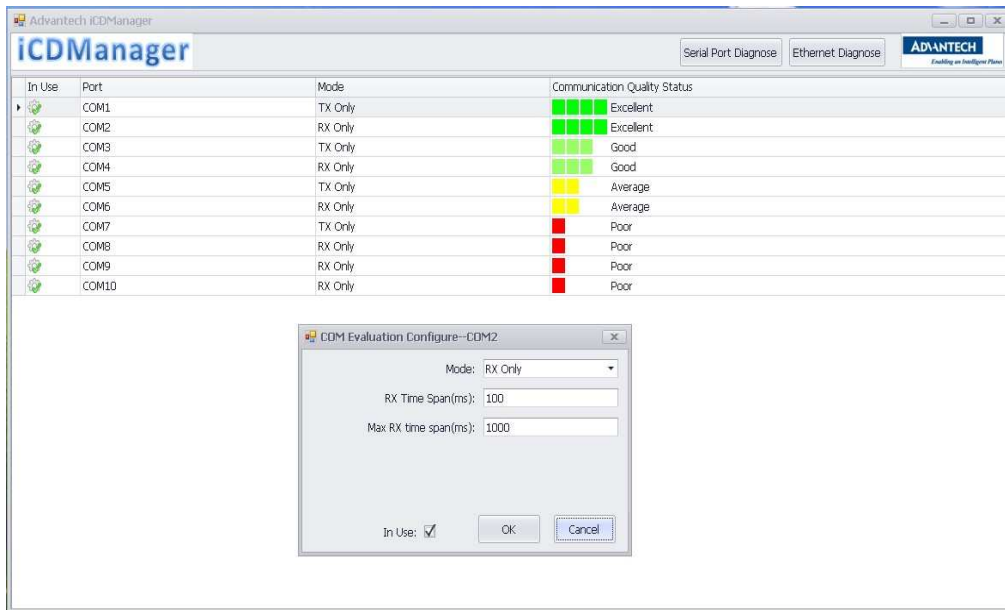
5. iCDManager for Ethernet communication

For the Ethernet Communication, iCDManager will monitor the network communication status (link or down) and Link speed (10M\100\1000M) , detect the speed of the link is 100Mb/s or 10Mb/s. 100Mbs , Elapsed of Last active time interval . iCDManager will indicate if there is any activity on the link; Physical LAN link status (connected or disconnected)

iCDManager will configure the communication mode and there will be four possible communication quality rating status as (Excellent & Good & Average & Poor)

the parameter setting description is as below :

- Normal Active Time Span (ms): the normal network Active time interval
- Max Active Time Span (ms): the Max network active time interval

iCDManager will indicate the LAN network will be active or silent and the physical link status will be normal or abnormal

When the actual active time interval < Normal Active Time Span, the network communication quality rating will be excellent ；when the actual active time interval > Max Active Time Span , the network communication quality rating will be poor .

For the other actual active time interval value , the LAN network communication quality rating will be calculated by the internal algorithm and Weight.

Parameter setting should be kept in the below range : Normal Active Time Span >100ms, Max Active Time Span >100 ms, Normal Active Time Span < Max Active Time Span.

For example : When ECU-4674 's Ethernet 1 is linked , if the network receive the data from the serial device every 1000 ms, the communication quality rating status will be Excellent

When there have no data transferring in the network, the actives and link status will change to be disconnected after 30s , it will be no physical link.
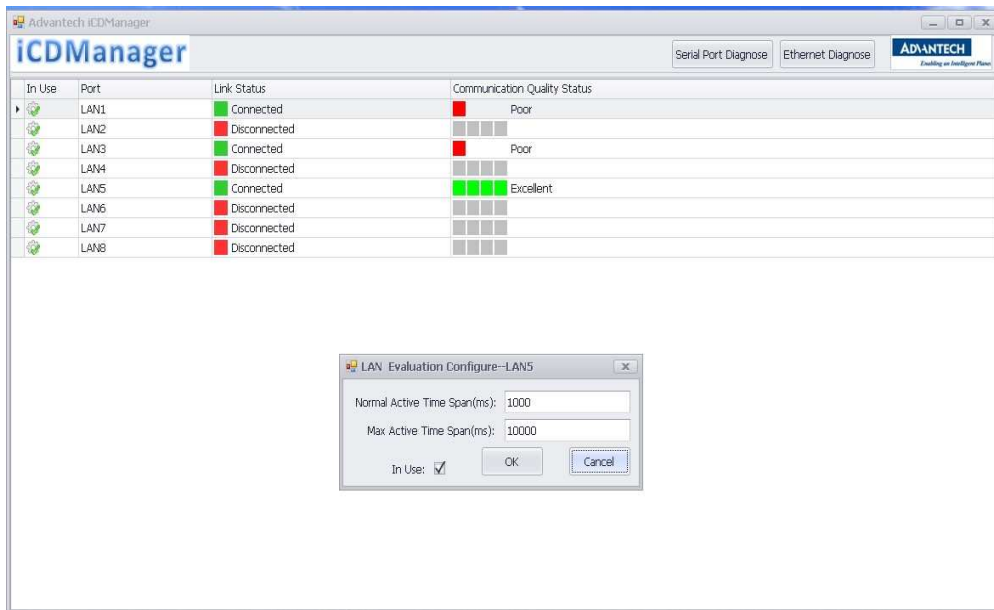
When ECU-4674 's Ethernet LAN 1 is linked , if the network receive the data from the serial device every 1000 ms, the communication quality rating status will be Excellent
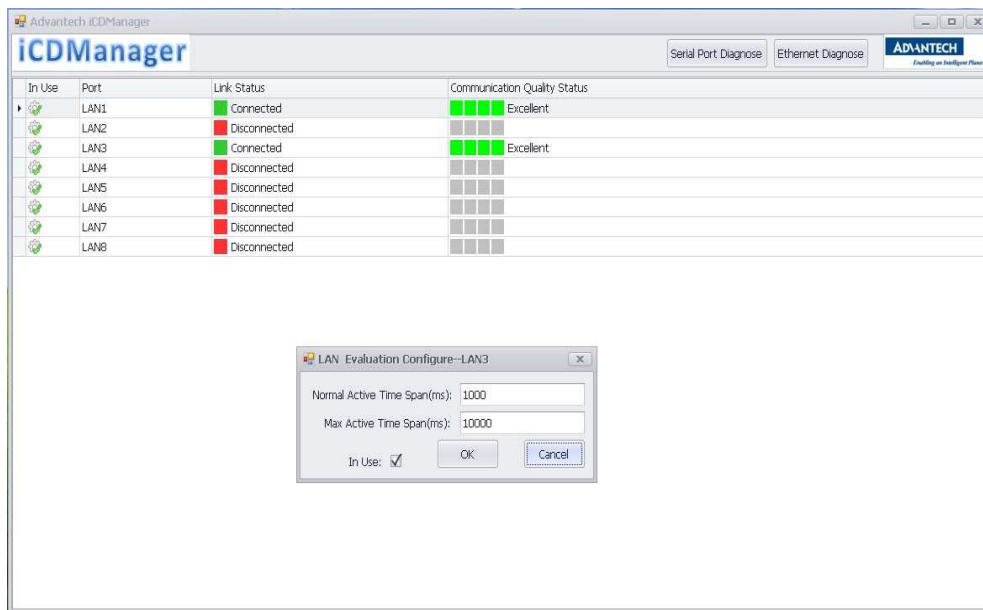
6. iCDManager   SDK & API   description

We have provide the iCDManager SDK and API for the customer programming , user can program the communication status   according   to   the below follow   .

pls. find the SDK help document of iCDManager for the detailed Function Description in Product CD.

Driver & SDK Description

（1）．IcdmGetSerialPortCount
Statement ：
uint IcdmGetSerialPortCount();
Function ：
Get the ECU serial port number
Parameter ： Null
Return Value：Serial port count of ECU。

(2)． IdcmGetSerialCommStatus
Statement ：
bool IdcmGetSerialCommStatus (uint portNumber,
CommDataType commDataType);
Function：
Get the serial communication status from the ECU
Parameter ：
Port Number：serial port number , for example : 1 represent COM1。
Comm. Data Type：communication data type ，0 is sending data，1 is receiving data.
Return value ： If data communication return true；else return false。

(3)．IcdmGetSerialCommExceptionTime
Statement ：
uint IcdmGetSerialCommExceptionTime(
uint portNumber,
CommDataType commDataType);
Function ： Get the ECU serial port abnormal communication status。
Parameter ：
Port number ： serial port number，for example: 1 represent COM1。
Comm. Data Type：communication data type ， 0 is for sending data , 1 is for receiving data。
Return value ： the serial communication abnormal status (ms)

(4)． IcdmGetSerialCommDataInterval
Statement ：
uint IcdmGetSerialCommDataInterval(uint portNumber);
Function ：
Get the sending and receiving time interval of the ECU serial communication
Parameter ：
Port Number：serial port number , for example : 1 represent COM1。
Return Value : the sending and receiving time interval for the serial port

(5)．IcdmGetSerialInfo

　　Statement：

　　　　bool IcdmGetSerialInfo(uint32 portNumber, uint32& RxElapsed, uint32& TxElapsed, uint32& ResponseTime);

　　Function：

　　　　Get the sending and receiving , response time interval 。

　　Parameter：

　　　　port Number：serial port number，for example :1 represent　COM1。

　　　　RxElapsed：receiving time interval (ms)

　　　　TxElapsed：sending time interval (ms)

　　　　ResponseTime：response time interval(ms)

　　Return value ：　return true when success, return false when failure

(6)．IcdmGetSerialRateConfig

　　Statement：

　　　　bool IcdmGetSerialRateConfig(uint32 portNumber, uint32& mode, uint32& AStandard, uint32& BStandard, uint32& AMax, uint32& BMax, uint32& Enable)

　　Function：

　　　　Get serial port monitor mode and parameter。

　　Parameter：

　　　　port Number：serial port number，for example: 1 represent　COM1。

　　　　mode：monitor mode ，1、Full Tx/Rx，2、Half Tx/Rx，3、Tx only，4、Rx only.

　　　　AStandard：A　standard value

　　　　BStandard：B　standard value

　　　　Amax：A Threshold

　　　　BMax：B Threshold

　　　　Enable：monitor function enable or disable，0: disable，1:enable

　　　Return value：return true if success , return false if fail.

(7)．IcdmSetSerialRateConfig

　　Statement：

　　　　bool IcdmSetSerialRateConfig(uint32 portNumber, uint32 mode, uint32 AStandard, uint32 BStandard, uint32 AMax, uint32 BMax, uint32 Enable)

　　Function：

　　　　Configure the ECU Serial Port monitor mode and parameter。

　　Parameter：

　　　　Port Number：serial port number，for example: 1 represent　COM1。

　　　　mode：monitor mode : 1. Full Tx/Rx，2.Half Tx/Rx，3.Tx only，4.Rx only.

　　　　AStandard：A standard value

　　　　BStandard：B standard value

　　　　Amax：A Threshold

　　　　BMax：B Threshold

　　　　Enable：monitor enable or disable ，0: disable，1: enable

　　　　Return Value：return true if success , return false if failure

(8). IcdmGetLANPortCount

Statement：

uint IcdmGetLANPortCount();

Function：Get the LAN Count of ECU

Parameter：Null

Return value：LAN Port number of ECU Device

(9). IcdmGetLANLinkStatus

Statement：

bool IcdmGetLANLinkStatus(uint portNumber);

Function：

Get the ECU device LAN communication link status 。

Parameter：

portNumber：LAN number，for example: 1 represent LAN1。

Return value: return true if LAN link is normal, return false if LAN Link is abnormal

(10). IcdmGetLANLinkExceptionTime

Statement：

uint IcdmGetLANLinkExceptionTime(uint portNumber);

Function：

Get the ECU LAN Communication Link Exception time interval

Parameter：

portNumber：LAN number，for example: 1 represent LAN1。

Return value：

LAN Communication link time interval of ECU （ms）。

(11). IcdmGetLANCommStatus

Statement：

bool IcdmGetLANCommStatus (uint portNumber);

Function：

Get ECU LAN Communication status

Parameter：

port Number：LAN Port number，for example: 1 represent LAN1。

Return Value：

Return true if LAN communication normal；else return false。

(12). IcdmGetLANCommExceptionTime

Statement：

uint IcdmGetLANCommExceptionTime(uint portNumber);

Function：

Get the ECU LAN communication abnormal status time interval

Parameter：

Port Number：LAN Port number，for example: 1 represent LAN1。

Return value：ECU abnormal communication time interval of ECU LAN(ms)

(13). IcdmGetLANInfo

Statement：

bool IcdmGetLANInfo(uint32 portNumber, uint32 &ElapsedOfLastActive,uint8 &LinkSpeed, uint8 &PhyiscLinkStatus);

Function：

Get ECU LAN data communication status

Parameter：

portNumber：LAN Number ， for example : 1 represent LAN1。

ElapsedOfLastActive：last active time interval

LinkSpeed：link mode : 0xa3 10M，0xa1 1000M, 0xa0 100M

PhyiscLinkStatus：link status ， 0: no link，1: link

Return value：

Return true if success , return false if failure

(14). IcdmGetLANRateConfig

Statement：

bool IcdmGetLANRateConfig (uint32 portNumber, uint32& mode, uint32& AStandard, uint32& BStandard, uint32& AMax, uint32& BMax, uint32& Enable)

Function：

Get the ECU LAN port's monitor mode and parameter。

Parameter：

portNumber：Lan Port number，for example:1 represent LAN1。

mode：monitor mode , 1、Full Tx/Rx,.

AStandard：A standard value

BStandard：B standard value

Amax：A Threshold

BMax：B Threshold

Enable：enable or disable monitor mode : 0: disable，1: enable

Return Value：return true if success , return false if failure

(15). IcdmSetLANRateConfig

Statement：

bool IcdmSetLANRateConfig (uint32 portNumber, uint32 mode, uint32 AStandard, uint32 BStandard, uint32 AMax, uint32 BMax, uint32 Enable)

Function：

Configure ECU LAN monitor mode and parameter：

portNumber：serial port number，for example: 1 represent LAN1。

mode：monitor mode: 1、Full Tx/Rx.

AStandard：A standard

BStandard：B standard

Amax：A threshold

BMax：B threshold

Enable：enable or disable monitor function，0: disable，1 represent enable.

Return value：return true if success , return false if failure

(16)．IcdmGetAllRate

Statement：

Bool   ICDMAPI   IcdmGetAllRate(unsigned   char   *pSerialRate,uint32 serialCount,unsigned char   *pLanRate,uint32 lanCount);

Function：

Get the ECU serial port rating result

Parameter：

pSerialRate：store the serial rating buffer，the buffer should keep the same with real serial port number。

serialCount：serial port number

pLanRate：store LAN port rating result buffer，the strength must be the same with LAN Port number。

lanCount：LAN Port number

Return value：return true if success , return false if failure

(17)．IcdmFWUpdate

Statement：

int IcdmFWUpdate(char* fileName);

Function：

Update Firmware

Parameter：

filename : Firmware file full path name

Return value：update Firmware result , 0 : success 。

(18) Data   structure and data type

```
enum CommDataType {
    SEND = 0,
    RECEIVE,
};
```
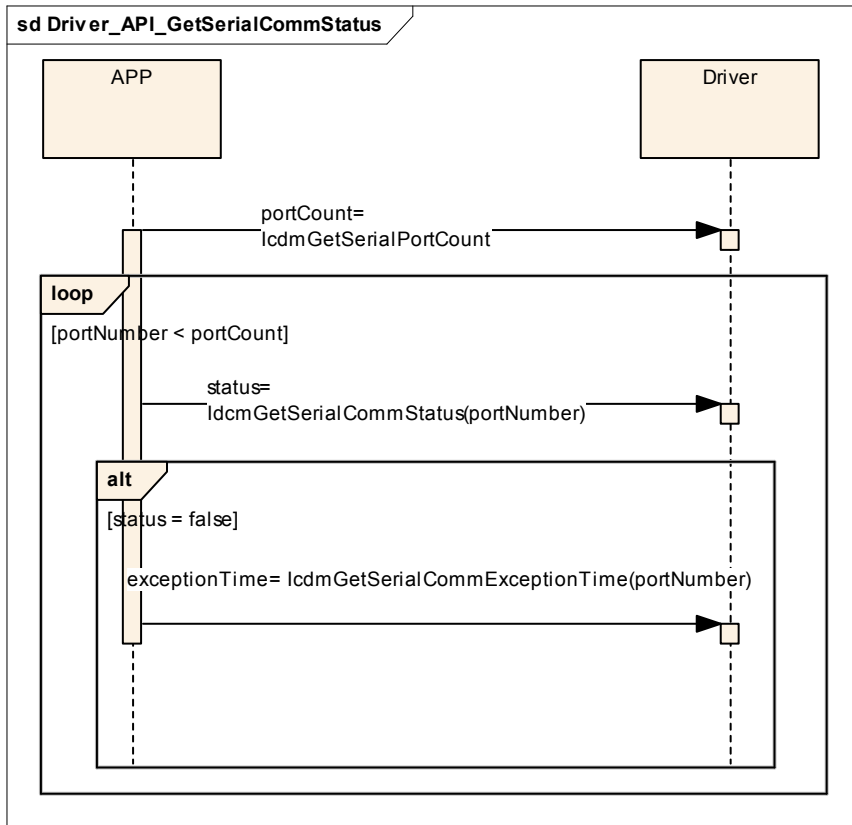
(19)．API call process

Figure 2 : get the serial communication status timing chart

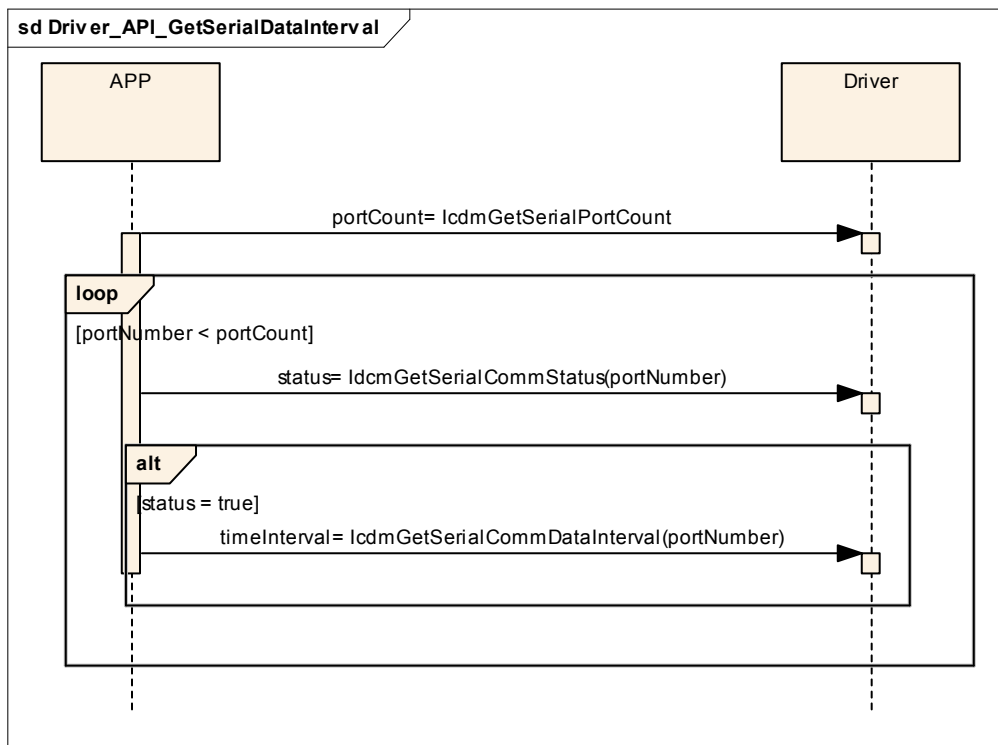Get the serial sending and receiving time interval

Figure 3   Get the serial port sending and receiving time interval chart

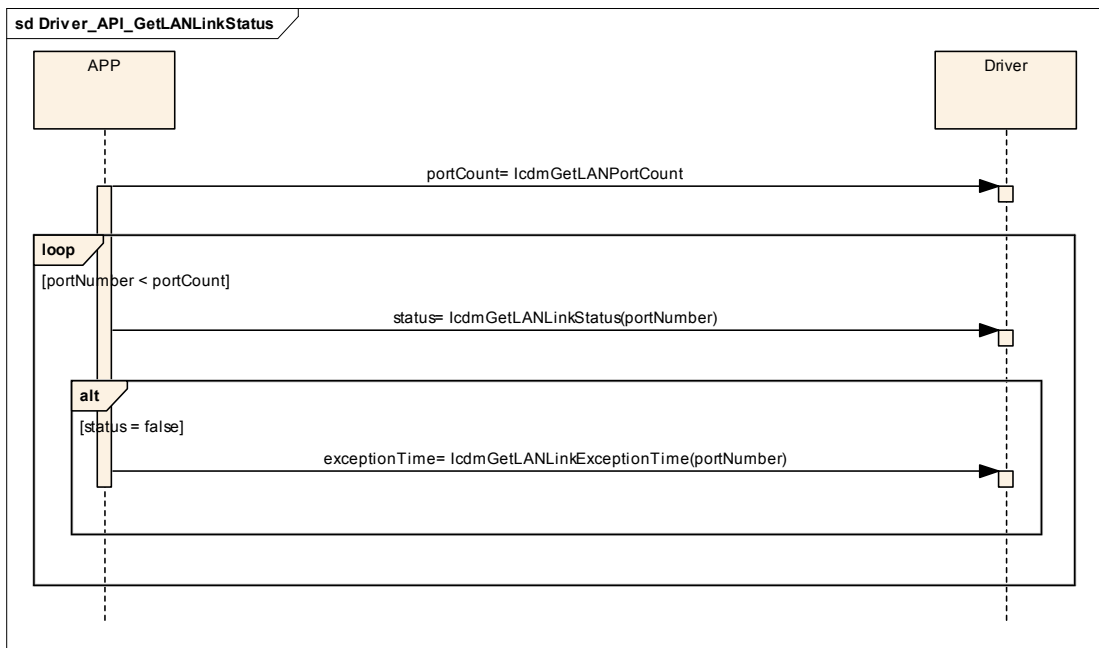Get the network communication link status

Figure 4 : Get LAN communication link status timing chart

Get LAN communication status