Interface Protocol

Ethernet

Devices: *iSYS-310x*

Revision: *4*

Date: *02.11.2015*

Table of content

0. History

Document revision	Date	Change log	Author
0.2	2014-09-11	preliminary release	TP
1	2014-12-17	connection optimized, webserver connection added actualize port numbers, added installation parameter DHCP restrictions	TP
2	2015-04-02	New IP configuration for setting fix IP-addresses. Works with: - Radar API Rev4 - Firmware firmware_TNK_0001_2000.tar	SG
3	2015-09-02	Product name changed to iSYS-310x cause this protocol is used by iSYS-3106 as well as iSYS-3104	TP
4	2015-10-26	Chapter with connection and troubleshooting added Application Message velocity unit changed to m/s	TP

1. Preface

This document describes the interface communication of the iSYS-310x systems over TCP/IP.

Numerical intervals in this documents do not imply the minimum and maximum values of the radar system.

The hardware description and pin assignment of the interface can found in the device datasheet.

2. Communication workflow

2.1. Overview

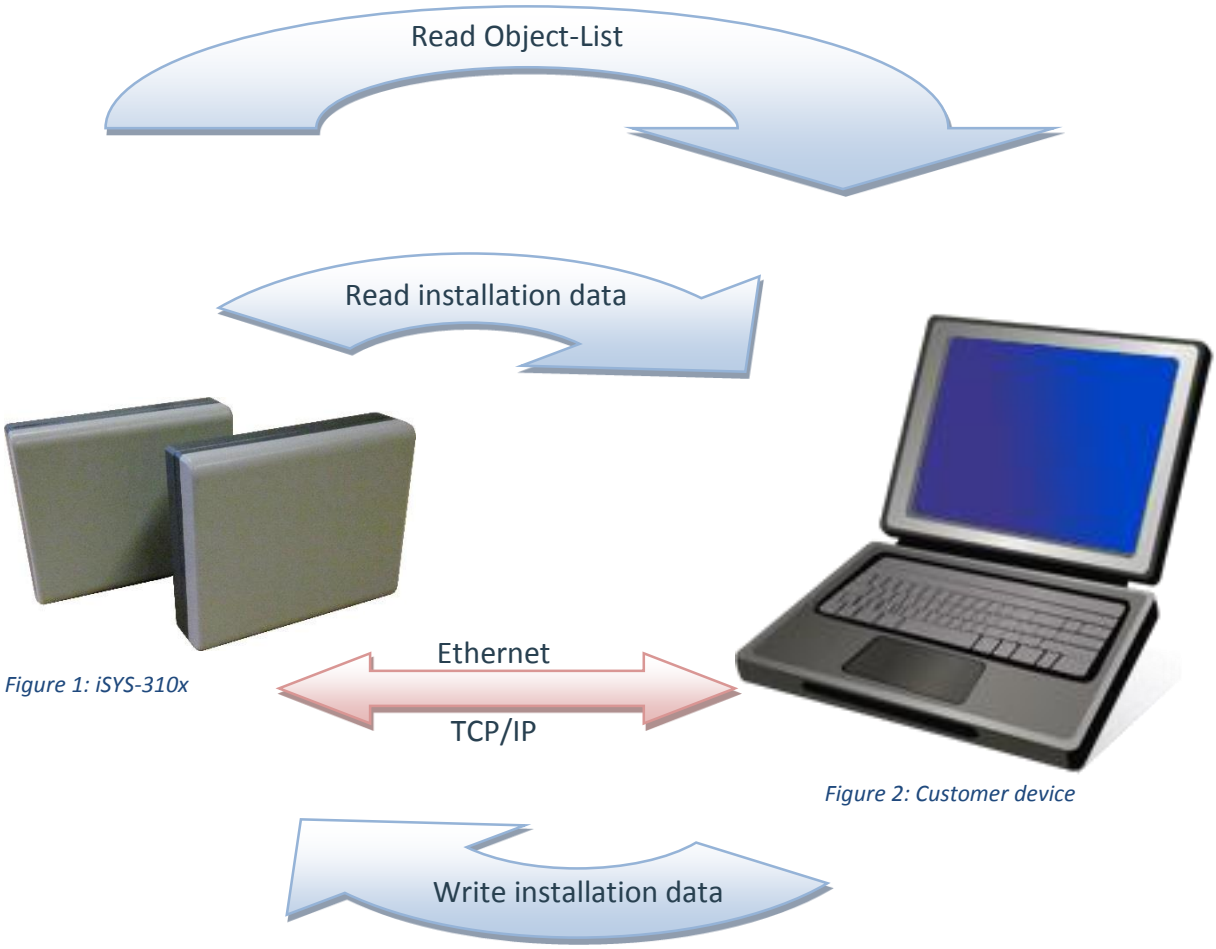


Figure 1: iSYS-310x

Figure 2: Customer device

2.2. Detailed description

The iSYS-310x is configurable for using DHCP server (delivery condition) or fix IP-addresses.

2.2.1. Connection using DHCP

After power up the OS of the system it boots up and requests the IP-address from a DHCP server. Get sure that the Ethernet is connected before power up. The boot process takes about 80 … 90s.

If no DHCP server available the system is set to the static IP-address (192.168.178.253) and Subnet-Mask (255.255.255.0). There is no cyclical request for DHCP server available.

Note: If there is no DHCP server available only one system can be used otherwise change configuration to static IP-addresses and set different addresses.

2.2.2. Connection using fix IP-address

After power up the OS of the system its boots up and set a fix IP-address and Subnet-Mask.

This fix IP-address and Subnet-Mask can set using radar SDK. After changing the system updates the settings immediately.

Note: Carefully check the new IP configuration before changing it on the system. There is no backup functionality available. If you set a fault IP-address or Subnet Mask and can´t reach the system over Ethernet again, InnoSenT has to disassemble the system to reset the IP configuration.

2.2.3. Changing TCP/IP setting

The IP configuration can changed between DHCP and fixed IP-address using radar SDK. After changing to DHCP the system requests an IP-address from DHCP server. If no DHCP server available the system is set to the static IP-address (192.168.178.253) and Subnet-Mask (255.255.255.0).

2.2.4. Communication

The communication works by sending/receiving data via TCP/IP socket connections. InnoSenT uses for this connections default ports determined in section Network Configuration.

2.2.5. Read/write data

InnoSenT provides a radar SDK. The radar SDK is a library (API) including all functions for communication with InnoSenT systems.

The API has functions for read/write installation data and receiving object lists and application messages.

2.2.6. Installation data

For a proper signal processing the installation data must be set.

Installation data for iSYS-3106:

- Installation height
- Yaw angles of the mounted sensors
- Installation Offset X
- Installation Offset Y

Installation data for iSYS-3104:

- Installation side (left, right, gantry)
- Installation height
- Yaw & Pitch angle
- Distance to first lane
- Direction (D), Distance to trigger line (T), Lateral offset (Y) to first lane, lane width (W) and length of lane (L) for each lane

2.2.7. Object list

Object lists are sent, if requested by radar API.

Object list information:

- Object Id
- Time stamp **(**)**
- Object class (0=not defined, 1=human, 2=passenger car, 3 truck) **(**)**
- Quality
- Position in x- and y-direction relative to pole (cartesian)
- Position in range and angle relative to pole (polar) **(*)**
- Velocity in x- and y-direction relative to pole
- Radial Velocity relative to pole **(*)**

(*) not implemented – prepared for future purposes.

(**) available for iSYS-3104 only

2.2.8. Application Message (iSYS-3104 only)

Every time when a vehicle crosses the trigger-line in the specified direction the iSYS-3104 sends an Application Message via UDP-Port. In delivery condition the default port number (chapter 3) is set and can changed using Radar-SDK or iGUI-3104.

The Application Messages are send automatically after connecting the system by Radar-API command and stops after disconnect.

Application Message information:

- Time stamp
- Lane number
- Speed in m/s
- Class (0=not defined, 1=human, 2=passenger car, 3 truck)

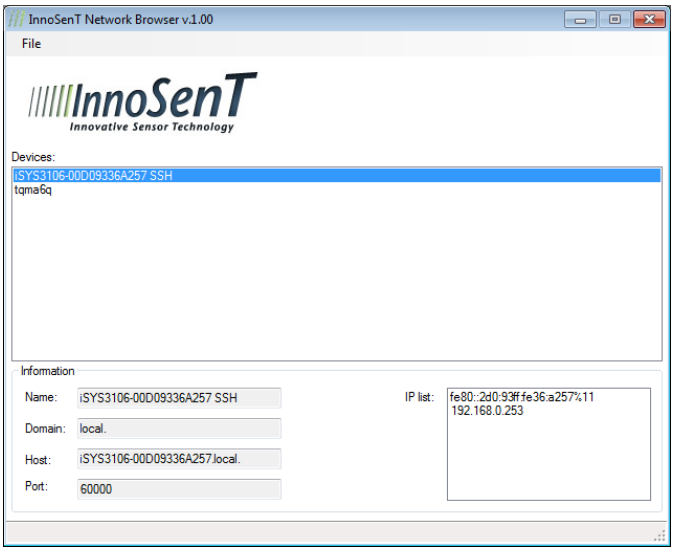
3. Network Configuration

	value	**comment**
Hostname	iSYS-310X-YYYYYYYYYYYY	X = Last number of device name Y = MAC address
IP-Address	-	assigned by DHCP Server or set by user
Static IP-address *Subnet-Mask*	192.168.178.253 255.255.255.0	Set, if no DHCP server available
Used TCP-IP Ports	60000-62000,	Both directions
Used UDP-Ports	62200 (default)	changeable by user

Note: The ports used by the iSYS-310x can be secured by windows firewall or other firewalls. Check the settings of the firewall if you have connection problems.

4. Troubleshooting

4.1. How to find the IP-address



InnoSenT provides a tool called “InnoSenT Network Browser” to search the connected Network for iSYS-310x Radar Sensors.

All devices found by the tool are listed. The IP-address is plotted in the Information field for the selected device.

The InnoSenT network browser works with devices delivered with Firmware Release v1.5.0 or higher.

Note: If you want to connect successful to the device get sure the IP-address and Subnet-Mask are compatible to the device settings.

4.2. Ethernet connection failed

If you cannot connect to your iSYS-310x open the command window and try to ping the device using the hostname printed on the device label.

In case the ping test fails it returns an error message like “can´t find device” or similar error messages. Try the following troubleshooting steps in sequence.

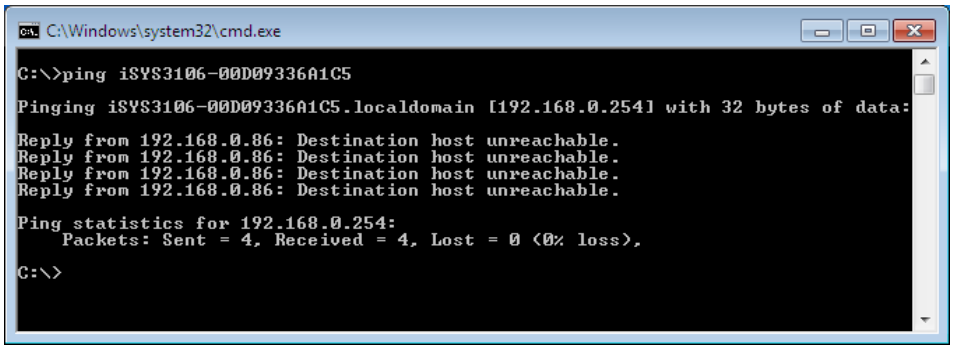


Figure 3: Screenshot ping test with hostname failed

4.2.1. Wait for DNS server update

After connecting the device the first time to your network the most possible reason could be that the DNS server hasn´t already added the assigned IP-address with the associated hostname to its table. In complex networks there are more than one DNS server and the synchronization between them often takes time. Wait a while and try the ping test with the hostname again. It is not unusual to wait half an hour for DNS server update.

4.2.2. Ping test with assigned IP-address

If the second test fails again, read the assigned IP-address from your DHCP server and try the ping test with the string “ping” followed by the IP-address (see Figure 4).

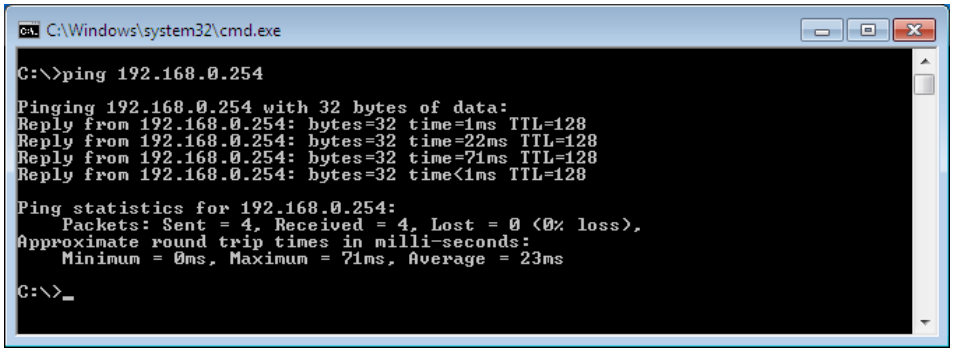


Figure 4: Screenshot ping test with IP-address

In case the DHCP server can´t find the IP-address (see Figure 5), check the power supply of the device and wait for about two minutes for the boot-up process. Check if the LEDs of the Ethernet port that the device is connected to are blinking.

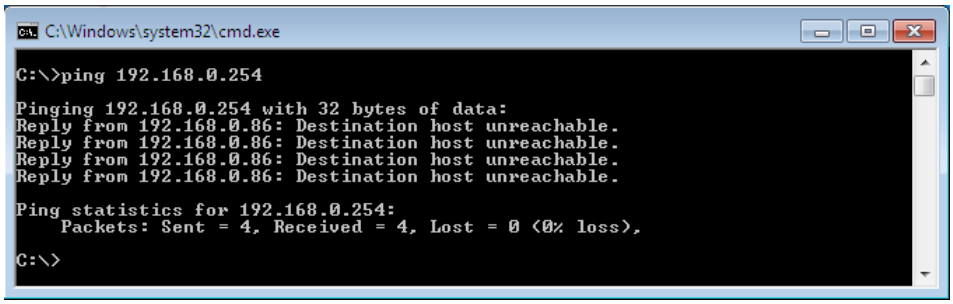


Figure 5: Screenshot ping test with IP-address failed

4.2.3. Check your own network settings

If ping test with the IP-address fails or the DHCP server can´t find the device check the network settings of the PC you are using.

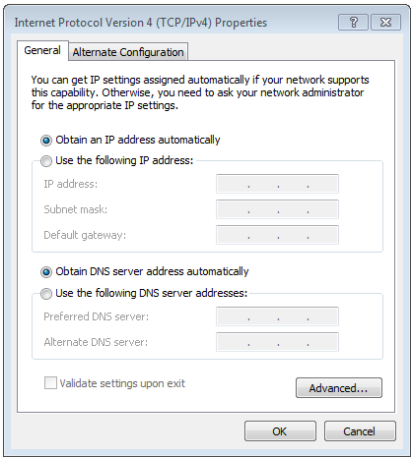


Figure 6: TCP/IP configuration for using DHCP server

4.2.4. Ping test with static IP-address

In cases no DHCP server is available the device sets a static IP-address. For starting the ping test with this IP-address change your network settings to following parameters:

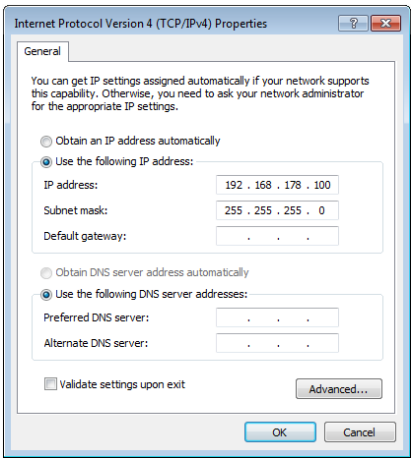


Figure 7: TCP/IP configuration for using static IP-address

After the new network settings are taken start the ping test with “ping 192.168.178.253”.

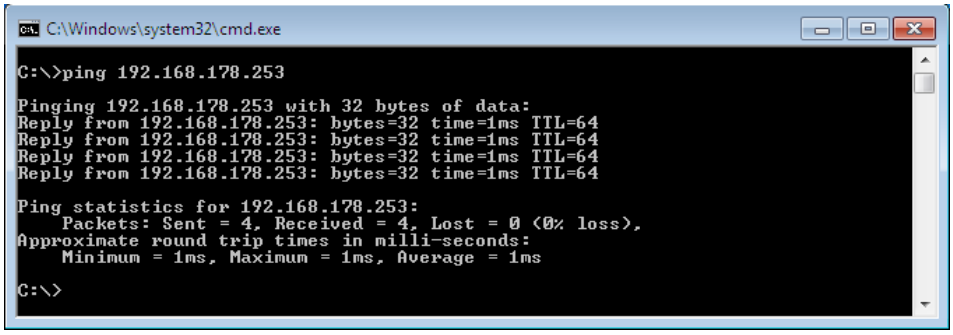


Figure 8: Screenshot ping test with static IP-address

If this ping test fails again, ensure that you are connected with only one iSYS-310x.

Also check the Ethernet LEDs on your PC Ethernet adapter and in case of using an Ethernet Switch the LEDs on the connected ports. If the LEDs are turned off, check the power supply of the iSYS-310x.

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