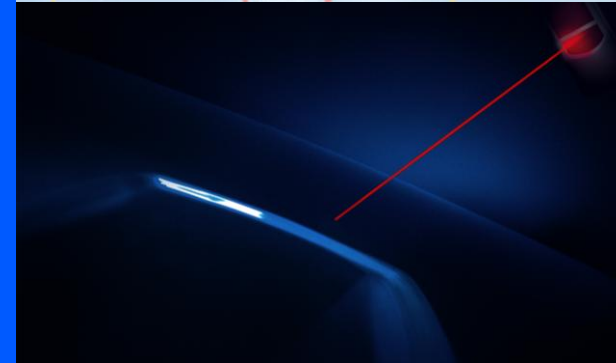


HOWTO: LIDAR SENSOR CONFIGURATIONS WITH LIDAR-LOC

Material Flow Solutions - Mobile Robots
AE Team

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Version 1.5

SICK Sensor Intelligence



AGENDA

1. Overview

- Purpose of this guide
- Example cases table of contents
- Safety Designer
- Safety Designer – Data output
- LiDAR-LOC SOPASAir web UI

2. Types of data transmission

- Unicasting
- Broadcasting
- Multicasting

3. Data transmission examples

- Unicasting
- Broadcasting
- Multicasting
- TCP Scanner

4. ROS driver configuration

01

OVERVIEW

OVERVIEW

Purpose of this guide

To show the user the different configurations that can be obtained using SICK scanners, LiDAR-LOC and customer's applications.

Examples shown using different types of data transmission:

- Unicasting
- Broadcasting
- Multicasting

With these examples, the user will have the necessary tools to configure LiDAR-LOC and the scanners to meet the requirements.

Note: All supported SICK scanners can be configured with all the different types of data transmission unless stated otherwise.



nanoScan3



picoScan150





microScan3



TiM571

OVERVIEW

Example cases table of contents

| Communication | Example # | Used sensor | LiDAR-LOC running on  | 2 nd LiDAR application in IPC, e.g., ROS/C++ driver  | |
|-----------------------------|--------------------|---|---|---|-----|
| Unicasting | 1 | 1x microScan3 (one data channel) | SIM1200 | no | |
| | 2 | | IPC ⁽¹⁾ | | |
| | 3 | 2x microScan3 (one data channel) | SIM1200 | | |
| | 4 | | IPC ⁽¹⁾ | | |
| | 5 | 1x nanoScan3 I/O ⁽²⁾ (two data channel) | SIM1200 | | yes |
| | 6 | | IPC ⁽¹⁾ | | |
| | 7 | 2x nanoScan3 I/O ⁽²⁾ (two data channel) | SIM1200 | | |
| | 8 | | IPC ⁽¹⁾ | | |
| Broadcasting ⁽³⁾ | 9 | 1x microScan3 | SIM1200 | | |
| | 10 | 2x microScan3 | SIM1200 | | |
| Multicasting | 11 | 1x picoScan150 | IPC ⁽¹⁾⁽³⁾ | | |
| | 12 | | SIM1200 | | |
| | 13 | 2x picoScan150 | IPC ⁽¹⁾⁽³⁾ | | |
| | 14 | 1x nanoScan3 | IPC ⁽¹⁾⁽³⁾ | | |
| TCP/IP | 15 | 1x TiM571 | SIM1200 | | |

- (1) In our examples, the **IPC always runs the main AGV application**, e.g., navigation. LiDAR-LOC runs either on IPC or SICK device, e.g., SIM1200
- (2) Only nanoScan3 I/O variants have a 2nd data output channel
- (3) Unicast and broadcast cannot be used for 2nd receiver of LiDAR data on the same IPC. Use multicast instead (Examples [11](#), [13](#) and [14](#))

OVERVIEW

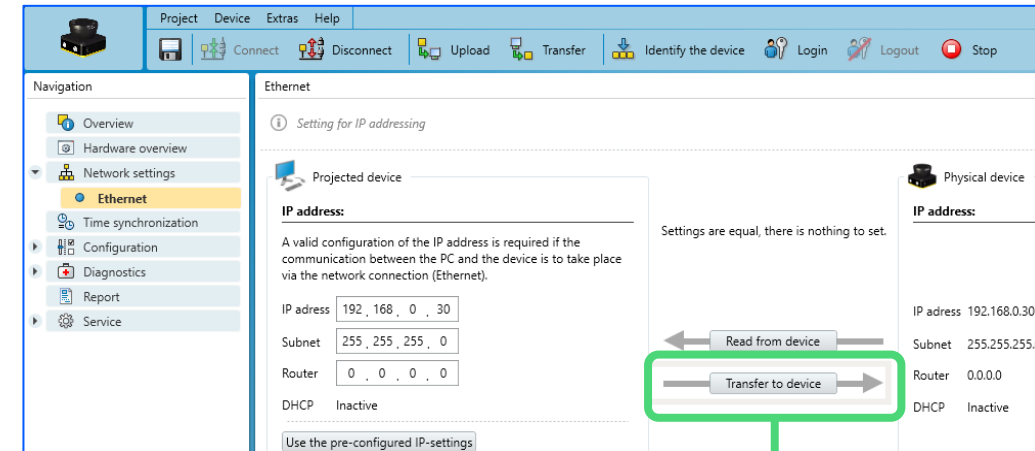
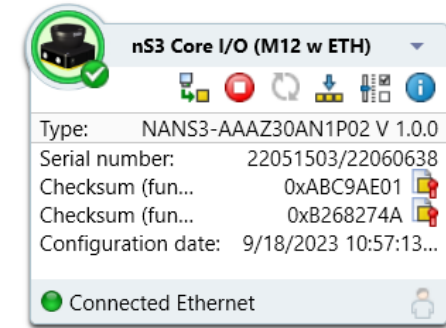
Safety Designer

Connection of sensor

With the correct configuration, the sensor should be visible in Safety Designer showing connection state.

Troubleshooting for missing sensor data:

- Devices need to be in the same subnet
- Safety Designer connection to device closed for data in LiDAR-LOC
- For Windows: Set network category to “private”.
- **Note:** For troubleshooting, please also check Operating Instructions chapter troubleshooting.



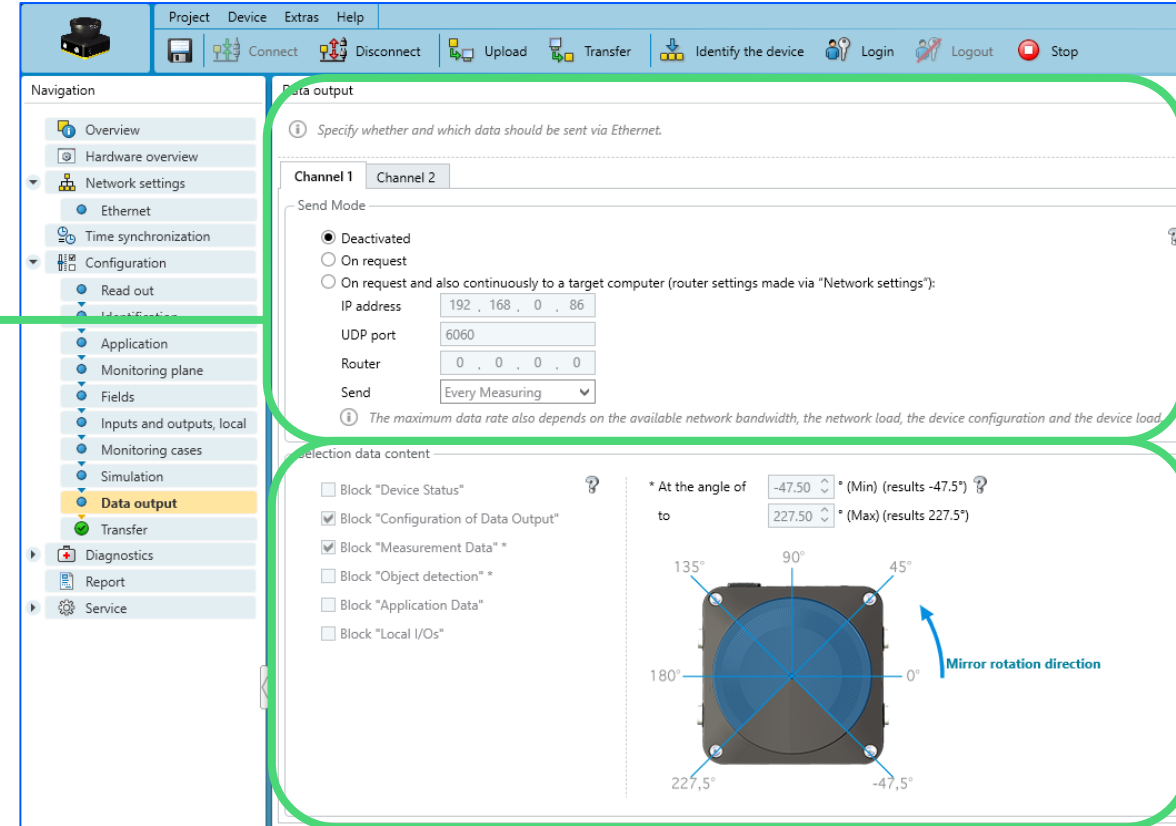
After changing the IP and settings, don't forget to transfer to device.

OVERVIEW

Safety Designer – Data output

Data output configuration

- **Deactivated:** No data output (In normal use cases it's fine to set as "Deactivated", as LiDAR-LOC will overwrite the config in SD)
- **On request:** Data is output when there is a request from a host computer via TCP/IP using CoLa2
- **On request and also continuously to a target computer:**
 - Continuous data output via UDP to a defined target address and for requests from a host computer via TCP/IP using CoLa2
 - Scan data for both LiDAR-LOC and other application (multiple receivers)
 - a. NANS3 I/O (2nd channel is available, no broadcasting needed):
 - I. channel1: Use for LiDAR-LOC, keep deactivated
 - II. channel2: manually set IP and UDP port for 2nd application
 - b. Other scanners (only 1 channel available):
 - I. set target IP address to X.X.X.**255** for UDP broadcasting
 - II. If needed, consistent port setting in SD (6060 in screenshot) and SOPASair (LiDARs > Interface > receiverPort > manual)



Only to be configured for option **On request and also continuously to a target computer**

OVERVIEW

LiDAR-LOC SOPASAir web UI

Usually, LiDAR-LOC **automatically configures** the scan data output of the LiDAR sensors.

Only for **broadcast** and **multicast**, the data output configuration of the LiDAR sensor **must be configured manually**.

Approach

1. In SOPASAir, open tab **Configuration**.
2. Select the **Setup** tab.
3. Select the 2D LiDAR sensor to configure:
 - a. *sensors > lidar*
4. To configure the **Interface**, select the **IP address** and **Port** of the sensor:
 - a. IP address: sensor IP
 - b. 2122: CoLa2 for nanoScan3, microScan3, outdoorScan3, picoScan1xx, multiScan1xx
 - c. 2111 or 2112: CoLa A/B for all other LiDAR sensors
5. Confirm the selection by clicking the **Apply** button.
6. Save the selection using the Save Permanent button.

The screenshot shows the SOPASAir web UI Configuration page. The left sidebar contains navigation tabs: DASHBOARD, CONFIGURATION (selected), MAPS, DIAGNOSIS, and ACTIVATION. The main content area is titled 'State' and includes a toggle for 'Configuration' (currently off) and 'Operation'. Below this, there are status messages: 'Loading user config successful', 'Configuration is saved permanently.', and 'Could not connect to scanner MICS3_front'. The 'Configuration' section has tabs for 'Upload & Download' and 'Setup' (selected). Under 'Setup', there are 'Apply' and 'Download Draft' buttons. A navigation bar below the buttons lists: Sensors, Vehicle, Communication, Map, Auto Start, Diagnosis, and Data Processing. The 'Sensors' tab is active, showing a list of sensors under 'LiDARs (Input)'. The 'mS3_front' sensor is selected, and its configuration is displayed. The 'Name' field is 'mS3_front'. The 'Active' checkbox is checked. The 'Mounted Upside Down' checkbox is unchecked. The 'Interface' section is expanded, showing configuration for the sensor: 'Ip Address' is '192.168.1.40', 'Port' is '2122' (with minus and plus buttons), 'Receiver Ip' is 'automatic', 'Receiver Port' is 'automatic', 'Max Connection Attempts On Startup' is 'automatic', and 'Time Offset' is 'automatic'.

02

TYPES OF DATA TRANSMISSION

TYPES OF DATA TRANSMISSION

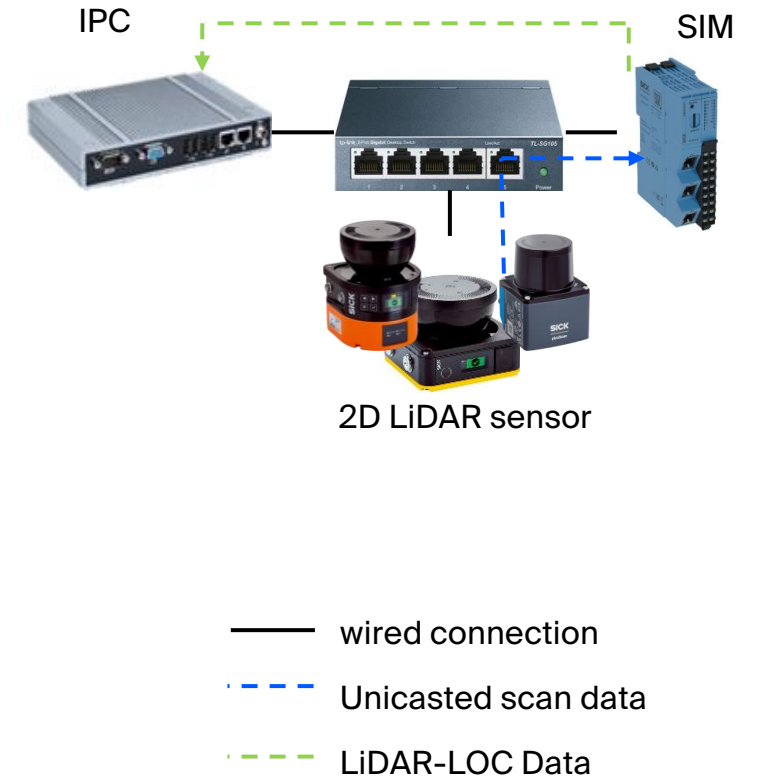
UDP or TCP Unicasting

Unicasting is used to transmit data from a single device to **a single device**.
With Unicasting the scan data is provided directly to the LiDAR-LOC device.
LiDAR-LOC **automatically configures** the scan data output of the LiDAR sensor.

Note:

- If the scanner has two channels, the scan data can be provided to two different devices.
- First channel is always automatically configured by LiDAR-LOC. The second channel is available for other applications (i.e., ROS drivers).

Unicasting configurations are shown from **examples 1 to 8**.



TYPES OF DATA TRANSMISSION

UDP broadcasting

Broadcasting is used to transmit data from a single device to **all devices in the network**.

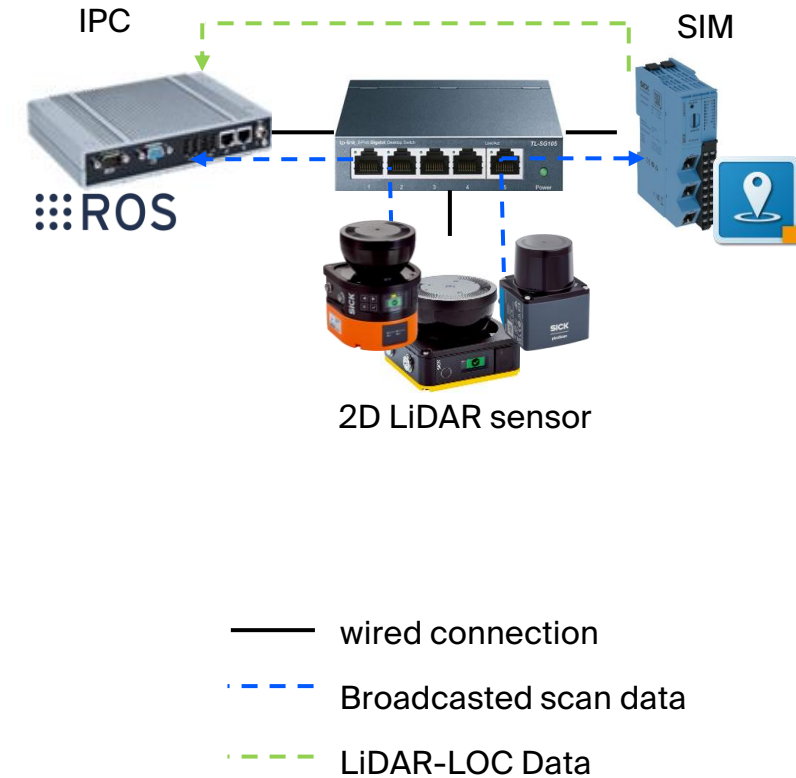
Broadcasting is used if:

- The LiDAR sensor does not have a second output channel
- LiDAR-LOC runs in one IPC, e.g., SIM1200 and the scan data is additionally required in a second IPC (e.g., ROS drivers).

LiDAR-LOC **does not automatically configure** the scan data output of the LiDAR sensor. All settings from the data output of the LiDAR sensor are kept.

Broadcasting configurations are shown from **examples 9 and 10**.

Note: TiM and other TCP based sensors do not support UDP broadcasting. Most sensors with TCP allow multiple receiver from the same sensor.



TYPES OF DATA TRANSMISSION

UDP multicasting

Multicasting is used to for 2 use cases

1. Transmit data from a single device **to a group of devices in the network.**
2. Transmit data from a single device to **a group of applications on a single device.**
E.g. send data from a LiDAR sensor to a single IPC running LiDAR-LOC and ROS drivers in parallel on the same device.

Multicasting allows multiple applications to run simultaneously with the same scan data, avoiding the port binding issues that occur with unicasting.

LiDAR-LOC **does not automatically configure** the scan data output of the LiDAR sensor. All settings from the data output of the LiDAR sensor are kept.

Multicasting use case 1 configuration is shown **in example 12**. Multicasting use case 2 configurations are shown **in example 11, 13 and 14**.

Note: TiM and other TCP based sensors do not support UDP broadcasting. Most sensors with TCP allow multiple receiver from the same sensor.

Use case 1



Use case 2



- wired connection
- - - Unicast scan data
- - - LiDAR-LOC Data

03

DATA TRANSMISSION EXAMPLES

UNICASTING

EXAMPLE 1

1 x Scanner, LiDAR-LOC in SIM



Settings in SD

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 0 . 0 . 0 . 0

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

i The maximum data rate also depends on the available network bandwidth, the network load, the device

LiDAR settings in SOPASair

mS3_front ^

Name: mS3_front

Active:

Mounted Upside Down:

Interface

Interface configuration for the sensor.

Ip Address: 192.168.1.40

Port: 2122

Receiver Ip: automatic

Receiver Port: automatic

Max Connection Attempts On Startup: automatic

Time Offset: automatic

EXAMPLE 1

1 x Scanner, LiDAR-LOC in SIM



| mS3 192.168.1.40 | | | | | |
|------------------|--------------|--------------|------------------------|-----------|-------------|
| LiDAR-LOC | ipAddress | 192.168.1.40 | Safety Designer | Channel 1 | Deactivated |
| | Port | 2122 | | IP | - |
| | receiverIP | automatic | | UDP port | - |
| | receiverPort | automatic | | | |

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|----------|--------------|-------------|----------|--------|--------------------|
| 57 | 0.348437 | 192.168.1.10 | 192.168.1.1 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 58 | 0.348549 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 59 | 0.398997 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 60 | 0.416714 | 192.168.1.10 | 192.168.1.1 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 61 | 0.416796 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 71 | 0.467319 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 72 | 0.483074 | 192.168.1.10 | 192.168.1.1 | LLS2 | 98 | 5008 → 5010 Len=56 |

LLS Pose

EXAMPLE 2

1 x Scanner, LiDAR-LOC in IPC



Settings in SD

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 0 . 0 . 0 . 0

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

i The maximum data rate also depends on the available network bandwidth, the network load, the device

LiDAR settings in SOPASair

mS3_front ^

Name: mS3_front

Active:

Mounted Upside Down:

Interface

Interface configuration for the sensor.

Ip Address: 192.168.1.40

Port: - 2122 +

Receiver Ip: automatic

Receiver Port: automatic

Max Connection Attempts On Startup: automatic

Time Offset: automatic

EXAMPLE 2

1 x Scanner, LiDAR-LOC in IPC



| mS3 192.168.1.40 | | | | | |
|------------------|--------------|--------------|-----------------|-----------|-------------|
| LiDAR-LOC | ipAddress | 192.168.1.40 | Safety Designer | Channel 1 | Deactivated |
| | Port | 2122 | | IP | - |
| | receiverIP | automatic | | UDP port | - |
| | receiverPort | automatic | | | |

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|--------------|---------------|----------|--------|------------------------|
| 3065 | 29.610176 | 192.168.1.40 | 192.168.1.1 | UDP | 1502 | 51003 → 51003 Len=1460 |
| 3066 | 29.615266 | 192.168.1.40 | 192.168.1.1 | UDP | 1502 | 51003 → 51003 Len=1460 |
| 3067 | 29.619380 | 192.168.1.40 | 192.168.1.1 | UDP | 454 | 51003 → 51003 Len=412 |
| 3068 | 29.623576 | 192.168.1.1 | 192.168.1.230 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 3069 | 29.645251 | 192.168.1.40 | 192.168.1.1 | UDP | 1502 | 51003 → 51003 Len=1460 |
| 3070 | 29.650324 | 192.168.1.40 | 192.168.1.1 | UDP | 1502 | 51003 → 51003 Len=1460 |
| 3071 | 29.654355 | 192.168.1.40 | 192.168.1.1 | UDP | 454 | 51003 → 51003 Len=412 |
| 3072 | 29.658049 | 192.168.1.1 | 192.168.1.230 | LLS2 | 98 | 5008 → 5010 Len=56 |

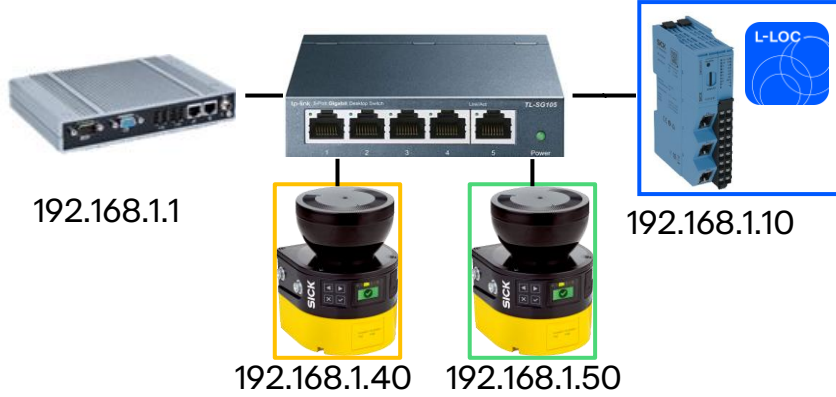
mS3

LLS Pose

A UDP port is automatically assigned

EXAMPLE 3

2 x Scanners, LiDAR-LOC in SIM



Settings in SD

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 0 . 0 . 0 . 0

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 0 . 0 . 0 . 0

UDP port: 6060

Router: 0 . 0 . 0 . 0

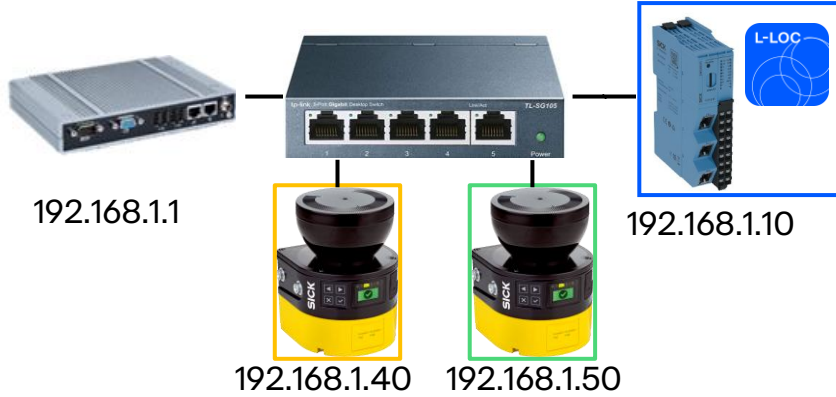
Send: Every Measuring

LiDAR settings in SOPASair

| mS3_front | mS3_back |
|---|---|
| Name: mS3_front | Name: mS3_back |
| Active: <input checked="" type="checkbox"/> | Active: <input checked="" type="checkbox"/> |
| Mounted Upside Down: <input type="checkbox"/> | Mounted Upside Down: <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address: 192.168.1.40 | Ip Address: 192.168.1.50 |
| Port: 2122 | Port: 2122 |
| Receiver Ip: automatic | Receiver Ip: automatic |
| Receiver Port: automatic | Receiver Port: automatic |
| Max Connection Attempts On Startup: automatic | Max Connection Attempts On Startup: automatic |
| Time Offset: automatic | Time Offset: automatic |

EXAMPLE 3

2 x Scanners, LiDAR-LOC in SIM



mS3 front

| LiDAR-LOC | ipAddress | 192.168.1.40 | Safety Designer | Channel 1 | Deactivated |
|-----------|--------------|--------------|-----------------|-----------|-------------|
| | Port | 2122 | | IP | - |
| | receiverIP | automatic | | UDP port | - |
| | receiverPort | automatic | | | |

mS3 back

| LiDAR-LOC | ipAddress | 192.168.1.50 | Safety Designer | Channel 1 | Deactivated |
|-----------|--------------|--------------|-----------------|-----------|-------------|
| | Port | 2122 | | IP | - |
| | receiverIP | automatic | | UDP port | - |
| | receiverPort | automatic | | | |

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

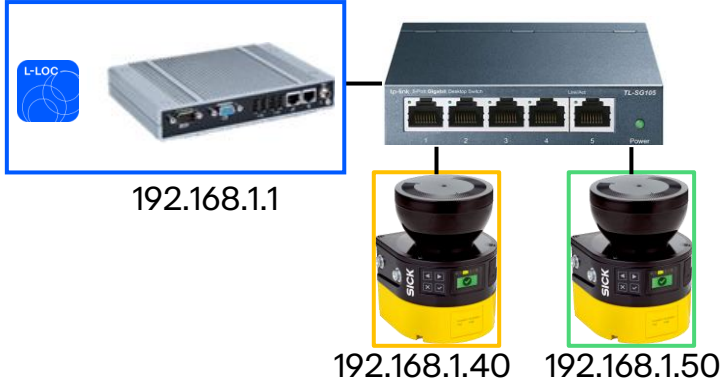
Apply a display filter ... <Ctrl-/>

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|----------|--------------|-------------|----------|--------|--------------------|
| 57 | 0.348437 | 192.168.1.10 | 192.168.1.1 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 58 | 0.348549 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 59 | 0.398997 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 60 | 0.416714 | 192.168.1.10 | 192.168.1.1 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 61 | 0.416796 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 71 | 0.467319 | 192.168.1.10 | 192.168.1.1 | LLS2 | 75 | 5008 → 5010 Len=33 |
| 72 | 0.483074 | 192.168.1.10 | 192.168.1.1 | LLS2 | 98 | 5008 → 5010 Len=56 |

LLS pose

EXAMPLE 4

2 x Scanners, LiDAR-LOC in IPC



Settings in SD

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 0 . 0 . 0 . 0

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 0 . 0 . 0 . 0

UDP port: 6060

Router: 0 . 0 . 0 . 0

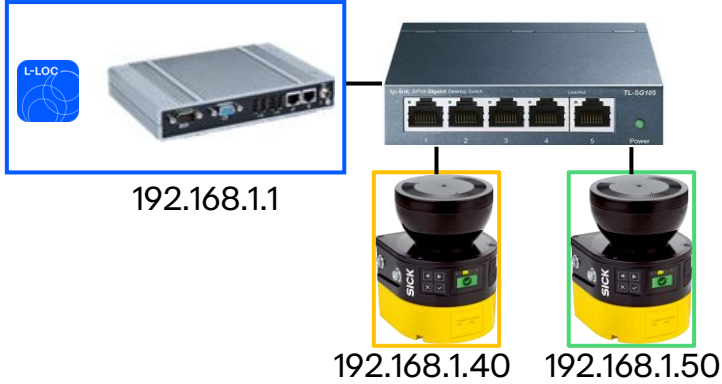
Send: Every Measuring

LiDAR settings in SOPASair

| mS3_front | mS3_back |
|---|---|
| Name: mS3_front | Name: mS3_back |
| Active: <input checked="" type="checkbox"/> | Active: <input checked="" type="checkbox"/> |
| Mounted Upside Down: <input type="checkbox"/> | Mounted Upside Down: <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address: 192.168.1.40 | Ip Address: 192.168.1.50 |
| Port: 2122 | Port: 2122 |
| Receiver Ip: automatic | Receiver Ip: automatic |
| Receiver Port: automatic | Receiver Port: automatic |
| Max Connection Attempts On Startup: automatic | Max Connection Attempts On Startup: automatic |
| Time Offset: automatic | Time Offset: automatic |

EXAMPLE 4

2 x Scanners, LiDAR-LOC in IPC



| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|--------------|---------------|----------|--------|------------------------|
| 2198 | 12.231781 | 192.168.1.1 | 192.168.1.230 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 2199 | 12.242722 | 192.168.1.50 | 192.168.1.1 | UDP | 1502 | 51007 → 51007 Len=1460 |
| 2200 | 12.247822 | 192.168.1.50 | 192.168.1.1 | UDP | 1502 | 51007 → 51007 Len=1460 |
| 2201 | 12.252059 | 192.168.1.50 | 192.168.1.1 | UDP | 454 | 51007 → 51007 Len=412 |
| 2202 | 12.258370 | 192.168.1.40 | 192.168.1.1 | UDP | 1502 | 51006 → 51006 Len=1460 |
| 2203 | 12.263372 | 192.168.1.40 | 192.168.1.1 | UDP | 1502 | 51006 → 51006 Len=1460 |
| 2204 | 12.267451 | 192.168.1.40 | 192.168.1.1 | UDP | 454 | 51006 → 51006 Len=412 |
| 2205 | 12.276368 | 192.168.1.1 | 192.168.1.230 | LLS2 | 98 | 5008 → 5010 Len=56 |
| 2206 | 12.282730 | 192.168.1.50 | 192.168.1.1 | UDP | 1502 | 51007 → 51007 Len=1460 |
| 2207 | 12.287886 | 192.168.1.50 | 192.168.1.1 | UDP | 1502 | 51007 → 51007 Len=1460 |

mS3_back

mS3_back

LLS pose

mS3 front

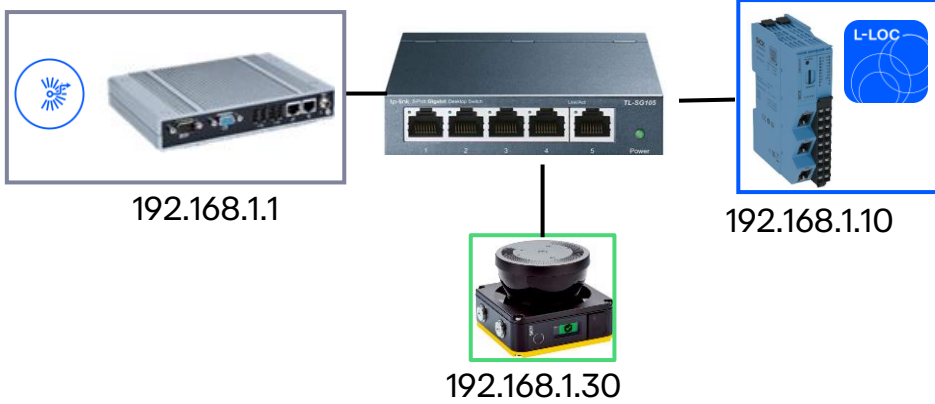
| LiDAR-LOC | ipAddress | 192.168.1.40 | Safety Designer | Channel 1 | Deactivated |
|-----------|--------------|--------------|-----------------|-----------|-------------|
| | Port | 2122 | | IP | - |
| | receiverIP | automatic | | UDP port | - |
| | receiverPort | automatic | | | |

mS3 back

| LiDAR-LOC | ipAddress | 192.168.1.50 | Safety Designer | Channel 1 | Deactivated |
|-----------|--------------|--------------|-----------------|-----------|-------------|
| | Port | 2122 | | IP | - |
| | receiverIP | automatic | | UDP port | - |
| | receiverPort | automatic | | | |

EXAMPLE 5

1 x Scanner (CH1&CH2), LiDAR-LOC in SIM & 2nd App in IPC



Settings in SD

| Channel 1 | Channel 2 |
|--|---|
| <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192, 168, 1, 10</p> <p>UDP port: 6065</p> <p>Router: 192, 168, 1, 1</p> <p>Send: Every Measuring</p> | <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192, 168, 1, 1</p> <p>UDP port: 6075</p> <p>Router: 0, 0, 0, 0</p> <p>Send: Every Measuring</p> <p><i>The maximum data rate also depends on</i></p> |

LiDAR settings in SOPASair

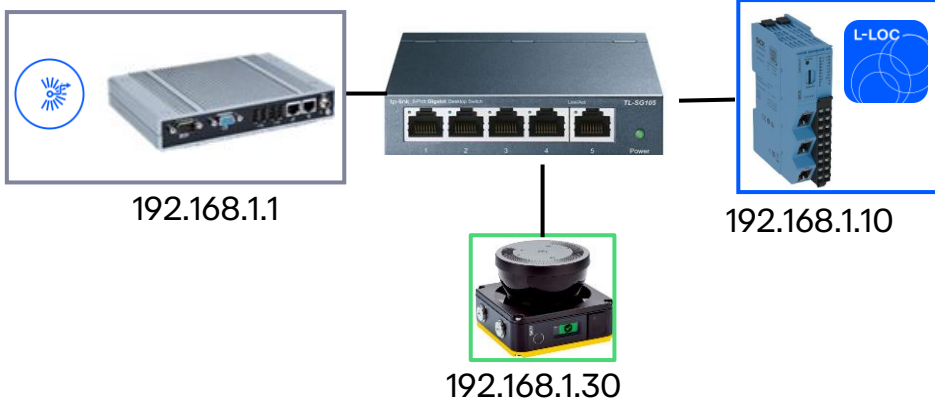
| | |
|---|-------------------------------------|
| Name | nS3_front |
| Active | <input checked="" type="checkbox"/> |
| Mounted Upside Down | <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address | 192.168.1.30 |
| Port | 2122 |
| Receiver Ip | 192.168.1.10 |
| Receiver Port | 6065 |
| Max Connection Attempts On Startup | automatic |
| Time Offset | automatic |

NOTE:

- LiDAR-LOC can only get data from “Channel 1”
- Setup can also work with automatic settings

EXAMPLE 5

1 x Scanner (CH1&CH2), LiDAR-LOC in SIM & 2nd App in IPC



| nS3 192.168.1.30 | | | | | |
|------------------|--------------|--------------|-----------------|-----------|-----------------------------|
| LiDAR-LOC | ipAddress | 192.168.1.30 | Safety Designer | Channel 1 | On request and continuously |
| | Port | 2122 | | IP | 192.168.1.10 |
| | receiverIP | 192.168.1.10 | | UDP port | 6060 |
| | receiverPort | 6065 | | Channel 2 | On request and continuously |
| | | | | IP | 192.168.1.1 |
| | | | | UDP port | 6075 |

NOTE:

- LiDAR-LOC can only get data from “Channel 1”
- Setup can also work with automatic settings

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|--------------|-------------|----------|--------|-----------------------|
| 813 | 2.011582762 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 814 | 2.036785117 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 815 | 2.036972972 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 816 | 2.037182596 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 817 | 2.037389520 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 818 | 2.037616622 | 192.168.1.30 | 192.168.1.1 | UDP | 1054 | 61401 → 6075 Len=1012 |

LLS Pose

nS3_front

EXAMPLE 6

1 x Scanner (CH1&CH2), LiDAR-LOC & 2nd App in IPC



Settings in SD

| Channel 1 | Channel 2 |
|---|---|
| <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192 . 168 . 1 . 1</p> <p>UDP port: 6060</p> <p>Router: 0 . 0 . 0 . 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> | <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192 . 168 . 1 . 1</p> <p>UDP port: 6070</p> <p>Router: 192 . 168 . 1 . 1</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> |

LiDAR settings in SOPASair

| | |
|---|-------------------------------------|
| Name | nS3_back |
| Active | <input checked="" type="checkbox"/> |
| Mounted Upside Down | <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address | 192.168.1.20 |
| Port | 2122 |
| Receiver Ip | manual 192.168.1.1 |
| Receiver Port | manual 6060 |
| Max Connection Attempts On Startup | automatic |
| Time Offset | automatic |

NOTE:

- LiDAR-LOC can only get data from “Channel 1”
- Setup can also work with automatic settings

EXAMPLE 6

1 x Scanner (CH1&CH2), LiDAR-LOC & 2nd App in IPC



| nS3 192.168.1.20 | | | | | |
|------------------|--------------|--------------|-----------------|-------------|-----------------------------|
| LiDAR-LOC | ipAddress | 192.168.1.20 | Safety Designer | Channel 1 | On request and continuously |
| | Port | 2122 | | IP | 192.168.1.1 |
| | receiverIP | 192.168.1.1 | | UDP port | 6060 |
| | receiverPort | 6060 | | Channel 2 | On request and continuously |
| | | | IP | 192.168.1.1 | |
| | | | UDP port | 6070 | |

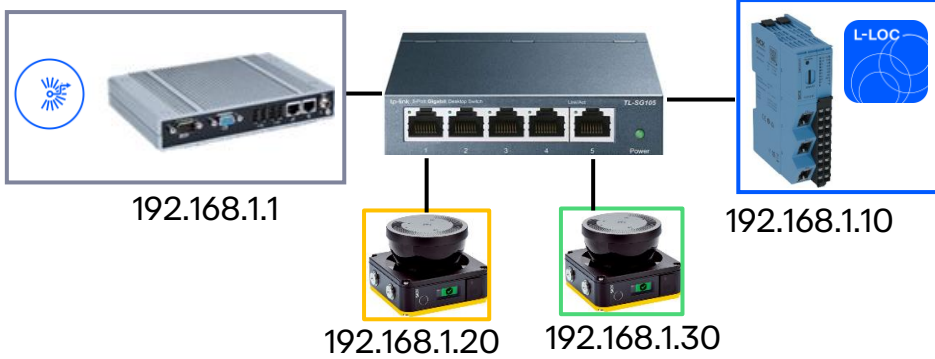
| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|--------------|---------------|----------|--------|----------------------|
| 1 | 0.000000000 | 192.168.1.1 | 192.168.1.123 | UDP | 98 | 5008 → 5010 Len=56 |
| 2 | 0.018419338 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 3 | 0.018595505 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 4 | 0.018892915 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 5 | 0.019093552 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 6 | 0.019283112 | 192.168.1.20 | 192.168.1.1 | UDP | 1054 | 6070 → 6070 Len=1012 |
| 7 | 0.019473501 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 8 | 0.019663037 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 9 | 0.019830853 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 10 | 0.020020101 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 11 | 0.020250716 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 12 | 0.020440660 | 192.168.1.20 | 192.168.1.1 | UDP | 201 | 6060 → 6060 Len=159 |

LLS pose

nS3 back

EXAMPLE 7

2 x Scanners (CH1&CH2), LiDAR-LOC in SIM & 2nd App in IPC



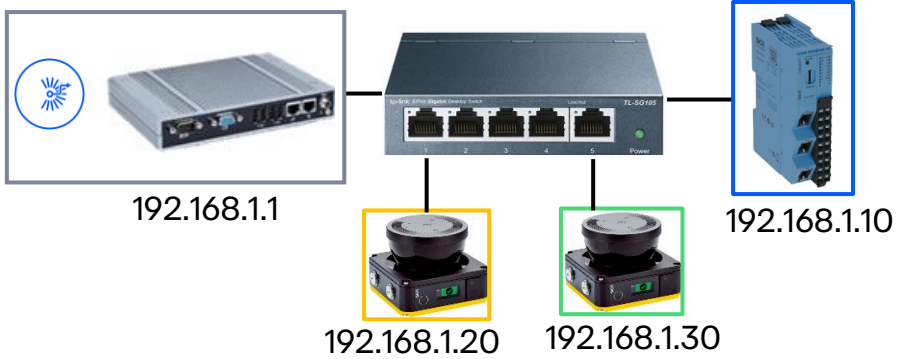
| Channel 1 | Channel 2 |
|--|--|
| <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192 . 168 . 1 . 10</p> <p>UDP port: 6060</p> <p>Router: 0 . 0 . 0 . 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> | <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192 . 168 . 1 . 10</p> <p>UDP port: 6065</p> <p>Router: 0 . 0 . 0 . 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> |
| <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192 . 168 . 1 . 1</p> <p>UDP port: 6070</p> <p>Router: 0 . 0 . 0 . 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> | <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192 . 168 . 1 . 1</p> <p>UDP port: 6075</p> <p>Router: 0 . 0 . 0 . 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> |

LiDAR settings in SOPASair

| nS3_back | nS3_front |
|---|---|
| Name: nS3_back | Name: nS3_front |
| Active: <input checked="" type="checkbox"/> | Active: <input checked="" type="checkbox"/> |
| Mounted Upside Down: <input type="checkbox"/> | Mounted Upside Down: <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address: 192.168.1.20 | Ip Address: 192.168.1.30 |
| Port: 2112 | Port: 2122 |
| Receiver Ip: manual (192.168.1.10) | Receiver Ip: manual (192.168.1.10) |
| Receiver Port: manual (6060) | Receiver Port: manual (6065) |
| Max Connection Attempts On Startup: automatic | Max Connection Attempts On Startup: automatic |
| Time Offset: automatic | Time Offset: automatic |

EXAMPLE 7

2 x Scanners (CH1&CH2), LiDAR-LOC in SIM & 2nd App in IPC



nS3 back 192.168.1.20

| LiDAR-LOC | | Safety Designer | |
|--------------|--------------|-----------------|-----------------------------|
| ipAddress | 192.168.1.20 | Channel 1 | On request and continuously |
| Port | 2122 | IP | 192.168.10 |
| receiverIP | 192.168.1.10 | UDP port | 6060 |
| receiverPort | 6060 | Channel 2 | On request and continuously |
| | | IP | 192.168.1.1 |
| | | UDP port | 6070 |

nS3 front 192.168.1.30

| LiDAR-LOC | | Safety Designer | |
|--------------|--------------|-----------------|-----------------------------|
| ipAddress | 192.168.1.30 | Channel 1 | On request and continuously |
| Port | 2122 | IP | 192.168.1.10 |
| receiverIP | 192.168.1.10 | UDP port | 6065 |
| receiverPort | 6065 | Channel 2 | On request and continuously |
| | | IP | 192.168.1.1 |
| | | UDP port | 6075 |

| No. | Time | Source | Destination | Proto | Length | Info |
|------|-------------|--------------|-------------|-------|--------|-----------------------|
| 2099 | 3.241955832 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 2100 | 3.252126315 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 2101 | 3.252298178 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 2102 | 3.252495637 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 2103 | 3.252698497 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 2104 | 3.252951936 | 192.168.1.20 | 192.168.1.1 | UDP | 1054 | 6070 → 6070 Len=1012 |
| 2106 | 3.259422855 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 2107 | 3.259650854 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 2108 | 3.259848374 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 2109 | 3.260084857 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61401 → 6075 Len=1460 |
| 2110 | 3.260311080 | 192.168.1.30 | 192.168.1.1 | UDP | 1054 | 61401 → 6075 Len=1012 |

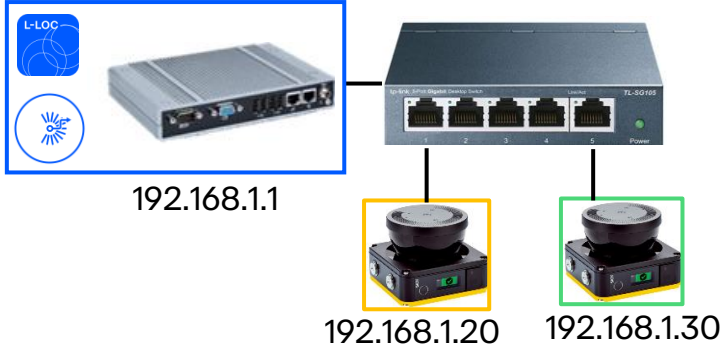
LLS Pose

nS3_back

nS3_front

EXAMPLE 8

2 x Scanners (CH1&CH2), LiDAR-LOC & 2nd App in IPC



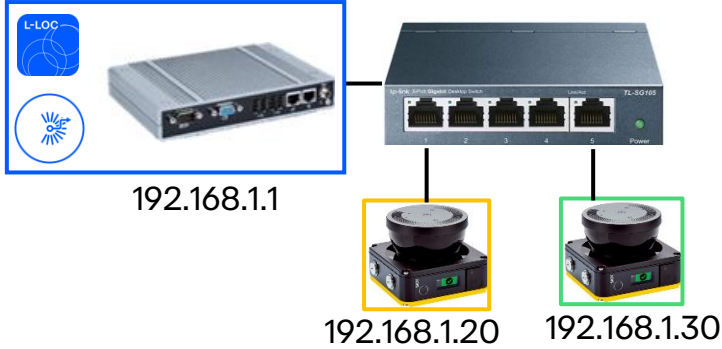
| Channel 1 | Channel 2 |
|---|---|
| <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192, 168, 1, 1</p> <p>UDP port: 6060</p> <p>Router: 0, 0, 0, 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> | <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192, 168, 1, 1</p> <p>UDP port: 6065</p> <p>Router: 0, 0, 0, 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> |
| <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192, 168, 1, 1</p> <p>UDP port: 6070</p> <p>Router: 0, 0, 0, 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> | <p>Send Mode</p> <p><input type="radio"/> Deactivated</p> <p><input type="radio"/> On request</p> <p><input checked="" type="radio"/> On request and also continuously to a target</p> <p>IP address: 192, 168, 1, 1</p> <p>UDP port: 6075</p> <p>Router: 0, 0, 0, 0</p> <p>Send: Every Measuring</p> <p><small>The maximum data rate also depends on</small></p> |

LiDAR settings in SOPASair

| nS3_back | nS3_front |
|---|---|
| Name: nS3_back | Name: nS3_front |
| Active: <input checked="" type="checkbox"/> | Active: <input checked="" type="checkbox"/> |
| Mounted Upside Down: <input type="checkbox"/> | Mounted Upside Down: <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address: 192.168.1.20 | Ip Address: 192.168.1.30 |
| Port: 2122 | Port: 2122 |
| Receiver Ip: manual (192.168.1.1) | Receiver Ip: manual (192.168.1.1) |
| Receiver Port: manual (6060) | Receiver Port: manual (6065) |
| Max Connection Attempts On Startup: automatic | Max Connection Attempts On Startup: automatic |
| Time Offset: automatic | Time Offset: automatic |

EXAMPLE 8

2 x Scanners (CH1&CH2), LiDAR-LOC & 2nd App in IPC



nS3 back 192.168.1.20

| LiDAR-LOC | ipAddress | 192.168.1.20 | Safety Designer | Channel 1 | On request and continuously |
|-----------|--------------|--------------|-----------------|-------------|-----------------------------|
| | Port | 2122 | | IP | 192.168.1.1 |
| | receiverIP | 192.168.1.1 | | UDP port | 6060 |
| | receiverPort | 6060 | | Channel 2 | On request and continuously |
| | | | IP | 192.168.1.1 | |
| | | | UDP port | 6070 | |

nS3 front 192.168.1.30

| LiDAR-LOC | ipAddress | 192.168.1.30 | Safety Designer | Channel 1 | On request and continuously |
|-----------|--------------|--------------|-----------------|-------------|-----------------------------|
| | Port | 2122 | | IP | 192.168.1.1 |
| | receiverIP | 192.168.1.1 | | UDP port | 6065 |
| | receiverPort | 6065 | | Channel 2 | On request and continuously |
| | | | IP | 192.168.1.1 | |
| | | | UDP port | 6075 | |

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|--------------|---------------|----------|--------|-----------------------|
| 38 | 0.028262628 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61737 → 6075 Len=1460 |
| 39 | 0.028421231 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61737 → 6075 Len=1460 |
| 40 | 0.028571975 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61737 → 6075 Len=1460 |
| 41 | 0.028761262 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 61737 → 6075 Len=1460 |
| 42 | 0.028950561 | 192.168.1.30 | 192.168.1.1 | UDP | 1054 | 61737 → 6075 Len=1012 |
| 43 | 0.029140893 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 52112 → 6065 Len=1460 |
| 44 | 0.029331392 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 52112 → 6065 Len=1460 |
| 45 | 0.029419496 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 52112 → 6065 Len=1460 |
| 46 | 0.029620663 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 52112 → 6065 Len=1460 |
| 47 | 0.029932902 | 192.168.1.30 | 192.168.1.1 | UDP | 1502 | 52112 → 6065 Len=1460 |
| 48 | 0.030122345 | 192.168.1.30 | 192.168.1.1 | UDP | 201 | 52112 → 6065 Len=159 |
| 49 | 0.030359452 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 50 | 0.030551440 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 51 | 0.030752079 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 52 | 0.030951914 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6070 → 6070 Len=1460 |
| 53 | 0.031142774 | 192.168.1.20 | 192.168.1.1 | UDP | 1054 | 6070 → 6070 Len=1012 |
| 54 | 0.031332421 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 55 | 0.031527456 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 56 | 0.031661640 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 57 | 0.032039075 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 58 | 0.032330206 | 192.168.1.20 | 192.168.1.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 59 | 0.032515857 | 192.168.1.20 | 192.168.1.1 | UDP | 201 | 6060 → 6060 Len=159 |
| 60 | 0.041417486 | 192.168.1.1 | 192.168.1.123 | UDP | 98 | 5008 → 5010 Len=56 |

nS3_front

nS3_back

LLS Pose



03

DATA TRANSMISSION EXAMPLES BROADCASTING

BROADCASTING

Safety Designer setting

For broadcast, LiDAR-LOC **does not** automatically configure or overwrite the scan data output of the LiDAR sensor.

All settings from the Data output configuration of the LiDAR sensor are kept and **must be configured manually**.

Approach

1. In the Safety Designer, open **Configuration > Data output**.
2. Choose **On request and additionally continuously**.
3. In section **Send Mode**, enter **the IP address** for broadcast.
 - a. E.g., IP address 192.168.1.255, when the IP addresses of the receivers are in 192.168.1.x
4. Enter the **UDP port**, for example, 6060.
5. In **Send**, select **Every Measuring**.
6. In section **Selection data content**, select the information blocks **Measurement Data** and **Configuration of Data Output**.

Navigation

- Overview
- Hardware
- Network settings
- Time synchronization
- Configuration
 - Read out
 - Identification
 - Protocol settings
 - Application
 - Monitoring plane
 - Fields
 - Inputs and outputs
 - Inputs and outputs, local
 - Monitoring cases
 - Simulation
 - Data output**
 - Transfer
- Diagnostics
- Report
- Service

Data output

Specify whether and which data should be sent via Ethernet.

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 192, 168, 1, 255

UDP port: 6060

Router: 192, 168, 1, 1

Send: Every Measuring

The maximum data rate also depends on the available network bandwidth, the network load, the device configuration and the device load.

Selection data content

- Block "Device Status"
- Block "Configuration of Data Output"
- Block "Measurement Data" *
- Block "Object detection" *
- Block "Application Data"
- Block "Local I/Os"

* At the angle of -47.5° (Min) (results -47.5°) to 227.5° (Max) (results 227.5°)

135° 90° 45° 0° -47,5° 227,5° 180°

Mirror rotation direction

EXAMPLE 9

1 x Scanner, LiDAR-LOC in SIM & 2nd App in IPC



Settings in SD

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 192 . 168 . 1 . 255

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

The maximum data rate also depends on the available network bandwidth, the network load, the de

LiDAR settings in SOPASair

mS3_front

Name: mS3_front

Active:

Mounted Upside Down:

Interface

Interface configuration for the sensor.

Ip Address: 192.168.1.40

Port: 2122

Receiver Ip: manual (192.168.1.10)

Receiver Port: manual (6060)

Max Connection Attempts On Startup: automatic

Time Offset: automatic

EXAMPLE 9

1 x Scanner, LiDAR-LOC in SIM & 2nd App in IPC



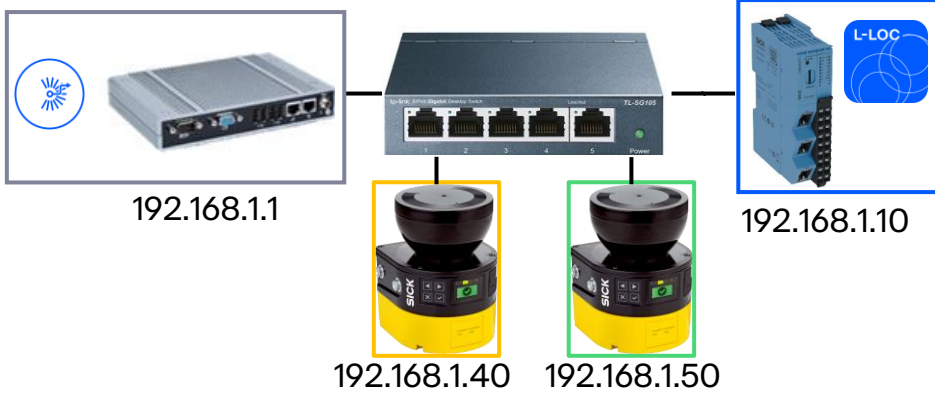
| mS3_front | | | | | |
|-----------|--------------|--------------|-----------------|-----------|-----------------------------|
| LiDAR-LOC | ipAddress | 192.168.1.40 | Safety Designer | Channel 1 | On request and continuously |
| | Port | 2122 | | IP | 192.168.1.255 |
| | receiverIP | 192.168.1.10 | | UDP port | 6060 |
| | receiverPort | 6060 | | | |

| No. | Time | Source | Destination | Protoccc | Length | Info |
|------|-------------|--------------|---------------|----------|--------|----------------------|
| 4835 | 8.453936171 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 4854 | 8.464947382 | 192.168.1.40 | 192.168.1.255 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 4874 | 8.470110052 | 192.168.1.40 | 192.168.1.255 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 4889 | 8.474041607 | 192.168.1.40 | 192.168.1.255 | UDP | 454 | 6060 → 6060 Len=412 |
| 4943 | 8.492871696 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 4985 | 8.504913969 | 192.168.1.40 | 192.168.1.255 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 5004 | 8.510052182 | 192.168.1.40 | 192.168.1.255 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 5010 | 8.514090526 | 192.168.1.40 | 192.168.1.255 | UDP | 454 | 6060 → 6060 Len=412 |

mS3
LLS Pose

EXAMPLE 10

2 x Scanners, LiDAR-LOC in SIM & 2nd App in IPC



Settings in SD

Send Mode

Deactivated
 On request
 On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 192 . 168 . 1 . 255

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

i The maximum data rate also depends on the available network bandwidth, the network load, the de

Send Mode

Deactivated
 On request
 On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 192 . 168 . 1 . 255

UDP port: 6061

Router: 192 . 168 . 1 . 1

Send: Every Measuring

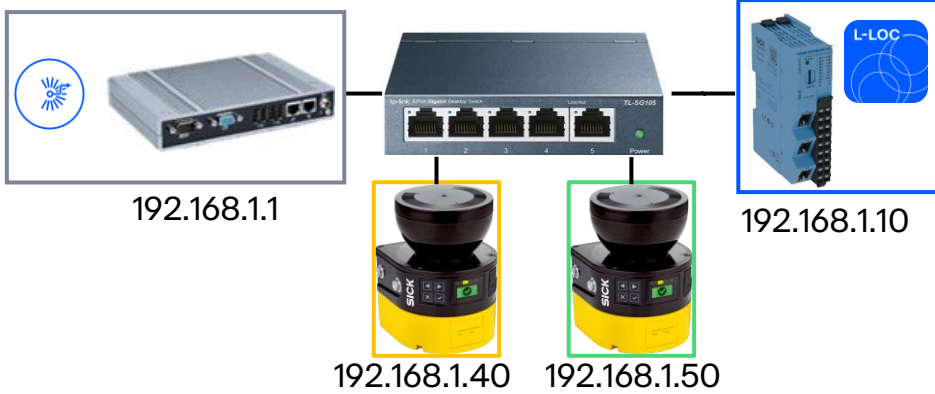
i The maximum data rate also depends on the available network bandwidth, the network load, the de

LiDAR settings in SOPASair

| mS3_front | mS3_back |
|---|---|
| Name: mS3_front | Name: mS3_back |
| Active: <input checked="" type="checkbox"/> | Active: <input checked="" type="checkbox"/> |
| Mounted Upside Down: <input type="checkbox"/> | Mounted Upside Down: <input type="checkbox"/> |
| Interface | |
| Interface configuration for the sensor. | |
| Ip Address: 192.168.1.40 | Ip Address: 192.168.1.50 |
| Port: 2122 | Port: 2122 |
| Receiver Ip: manual | Receiver Ip: manual |
| Receiver Port: manual | Receiver Port: manual |
| Max Connection Attempts On Startup: automatic | Max Connection Attempts On Startup: automatic |
| Time Offset: automatic | Time Offset: automatic |

EXAMPLE 10

2 x Scanners, LiDAR-LOC in SIM & 2nd App in IPC



mS3_front

| mS3_front | | | Safety Designer | | |
|-----------|--------------|--------------|-----------------|-----------------------------|--|
| LiDAR-LOC | ipAddress | 192.168.1.40 | Channel 1 | On request and continuously | |
| | Port | 2122 | IP | 192.168.1.255 | |
| | receiverIP | 192.168.1.10 | UDP port | 6060 | |
| | receiverPort | 6060 | | | |

mS3_back

| mS3_back | | | Safety Designer | | |
|-----------|--------------|--------------|-----------------|-----------------------------|--|
| LiDAR-LOC | ipAddress | 192.168.1.50 | Channel 1 | On request and continuously | |
| | Port | 2122 | IP | 192.168.1.255 | |
| | receiverIP | 192.168.1.10 | UDP port | 6070 | |
| | receiverPort | 6070 | | | |

The screenshot shows a Wireshark capture of network traffic. The interface includes a menu bar (File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Wireless, Tools, Help) and a toolbar. A display filter is applied: 'Apply a display filter ... <Ctrl-/>'. The packet list table is as follows:

| No. | Time | Source | Destination | Protoc | Length | Info |
|------|-------------|--------------|---------------|--------|--------|----------------------|
| 2569 | 5.443641940 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 2570 | 5.444975773 | 192.168.1.50 | 192.168.1.255 | UDP | 1502 | 6061 → 6061 Len=1460 |
| 2571 | 5.449985716 | 192.168.1.50 | 192.168.1.255 | UDP | 1502 | 6061 → 6061 Len=1460 |
| 2572 | 5.453652764 | 192.168.1.40 | 192.168.1.255 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 2573 | 5.454172135 | 192.168.1.50 | 192.168.1.255 | UDP | 178 | 6061 → 6061 Len=136 |
| 2574 | 5.458751566 | 192.168.1.40 | 192.168.1.255 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 2575 | 5.462803357 | 192.168.1.40 | 192.168.1.255 | UDP | 454 | 6060 → 6060 Len=412 |
| 2576 | 5.482703060 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |

LLS pose
mS3_back

mS3_front

03

DATA TRANSMISSION EXAMPLES

MULTICASTING

MULTICASTING

Safety Designer setting

For broadcast, LiDAR-LOC **does not** automatically configure or overwrite the scan data output of the LiDAR sensor.

All settings from the Data output configuration of the LiDAR sensor are kept and **must be configured manually**.

Approach

1. In the Safety Designer, open **Configuration > Data output**.
2. Choose **On request and additionally continuously**.
3. In section **Send Mode**, enter **the IP address** for broadcast.
 - a. E.g., IP address 224.0.0.1, when the IP addresses of the receivers are in 192.168.1.x
4. Enter the **UDP port**, for example, 6060.
5. In **Send**, select **Every Measuring**.
6. In section **Selection data content**, select the information blocks **Measurement Data** and **Configuration of Data Output**.

The screenshot shows the 'Data output' configuration window in the Safety Designer. On the left is a navigation tree with 'Data output' selected. The main panel is divided into two sections: 'Send Mode' and 'Selection data content'.

Send Mode:

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings")

Fields for the selected mode:

- IP address: 224 . 0 . 0 . 1
- UDP port: 6060
- Router: 192 . 168 . 1 . 1
- Send: Every Measuring

Selection data content:

- Block "Device Status"
- Block "Configuration of Data Output"
- Block "Measurement Data"
- Block "Object detection"
- Block "Application Data"
- Block "Local I/Os"

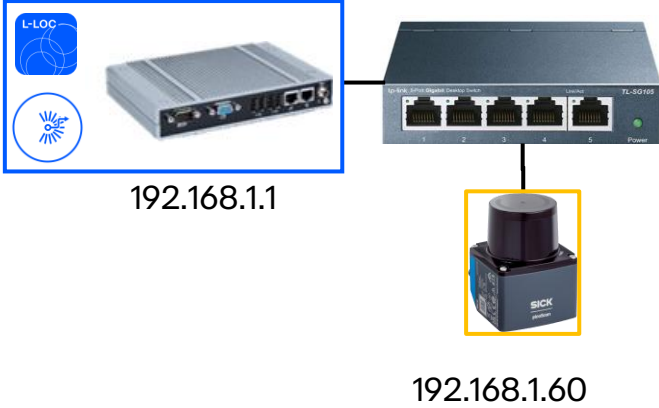
Angular range settings:

- At the angle of: -47.50 ° (Min) (results -47.5°)
- to: 227.50 ° (Max) (results 227.5°)

A diagram of the LiDAR sensor's field of view is shown, with a blue circular scan area. The scan is divided into segments with angles: 135°, 90°, 45°, 0°, -47.5°, -227.5°, and 180°. A blue arrow indicates the 'Mirror rotation direction'.

EXAMPLE 11

1 x Scanner, LiDAR-LOC & 2nd App in IPC



Measurement data output

Format ⓘ Compact

Protocol UDP

Port 56662

Destination IP address 224.0.0.1

Start/stop data output

Settings in SOPASair (picoScan GUI)

LiDAR settings in SOPASair

5 picoscan_front

Name picoscan_front

Active

Mounted Upside Down

Interface

Interface configuration for the sensor.

Ip Address 192.168.1.60

Port 2111

Receiver Ip manual

224.0.0.1

Receiver Port manual

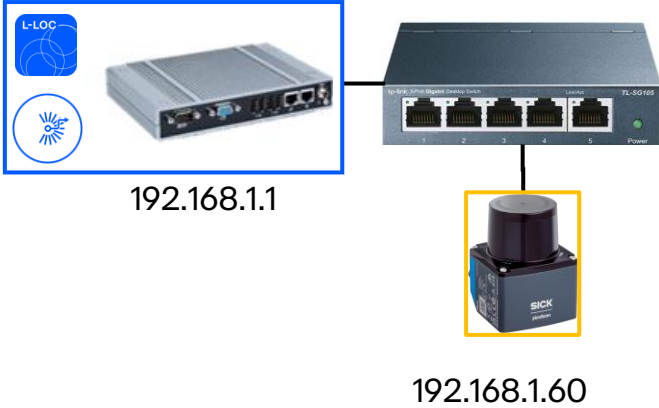
56662

Max Connection Attempts On Startup automatic

Time Offset automatic

EXAMPLE 11

1 x Scanner, LiDAR-LOC & 2nd App in IPC



| PicoScan 192.168.1.60 | | | |
|-----------------------|----------------|--------------|--|
| LiDAR-LOC | ipAddress | 192.168.1.60 | |
| | Port | 2111 | |
| | receiverIP | 224.0.0.1 | |
| | receiverPort | 56662 | |
| SOPASair | Destination IP | 224.0.0.1 | |
| | UDP port | 56662 | |

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-------------|---------------|---------------|----------|--------|------------------------|
| 4681 | 6.800866931 | 192.168.1.1 | 192.168.1.123 | HTTP | 226 | HTTP/1.1 200 OK (appli |
| 4682 | 6.803600662 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4683 | 6.806894889 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4684 | 6.810569889 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4685 | 6.814670876 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4686 | 6.818883499 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4687 | 6.823263942 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4688 | 6.827210789 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4689 | 6.831466588 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4690 | 6.833164263 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 4691 | 6.835656891 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 50818 → 80 [ACK] Seq=1 |
| 4692 | 6.839756666 | 192.168.1.1 | 192.168.1.123 | UDP | 98 | 5008 → 5010 Len=56 |
| 4693 | 6.839999270 | 192.168.1.1 | 192.168.1.123 | UDP | 82 | 5008 → 5010 Len=40 |
| 4694 | 6.840190538 | 192.168.1.1 | 192.168.1.123 | UDP | 82 | 5008 → 5010 Len=40 |
| 4695 | 6.840385837 | 192.168.1.1 | 192.168.1.123 | UDP | 82 | 5008 → 5010 Len=40 |

picoscan

LLS Pose

EXAMPLE 12

1 x Scanner, LiDAR-LOC in SIM & 2nd App in IPC



Measurement data output

Format ⓘ Compact

Protocol UDP

Port 56662

Destination IP address 224.0.0.1

Start/stop data output

Settings in SOPASair (picoScan GUI)

LiDAR settings in SOPASair

5 picoscan_front

Name picoscan_front

Active

Mounted Upside Down

Interface

Interface configuration for the sensor.

Ip Address 192.168.1.60

Port 2111

Receiver Ip manual

224.0.0.1

Receiver Port manual

56662

Max Connection Attempts On Startup automatic

Time Offset automatic

EXAMPLE 12

1 x Scanner, LiDAR-LOC in SIM & 2nd App in IPC



PicoScan 192.168.1.60

| | | |
|-----------|--------------|--------------|
| LiDAR-LOC | ipAddress | 192.168.1.60 |
| | Port | 2111 |
| | receiverIP | 224.0.0.1 |
| | receiverPort | 56662 |

| | | |
|----------|----------------|-----------|
| SOPASAir | Destination IP | 224.0.0.1 |
| | UDP port | 56662 |

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|--------------|-------------|----------|--------|-----------------------|
| 10 | 0.027853974 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 11 | 0.031945877 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 12 | 0.033413860 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 13 | 0.050055684 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 14 | 0.050345772 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 15 | 0.053076684 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 16 | 0.057135095 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 17 | 0.061205410 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 18 | 0.065375841 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 19 | 0.069516836 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 20 | 0.073750111 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 21 | 0.077981010 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 22 | 0.081992873 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |
| 23 | 0.083313532 | 192.168.1.60 | 224.0.0.1 | UDP | 990 | 58819 → 56662 Len=948 |

LLS Pose

picoscan

EXAMPLE 13

2 x Scanners, LiDAR-LOC & 2nd App in IPC



Settings in SOPASair (picoScan GUI)

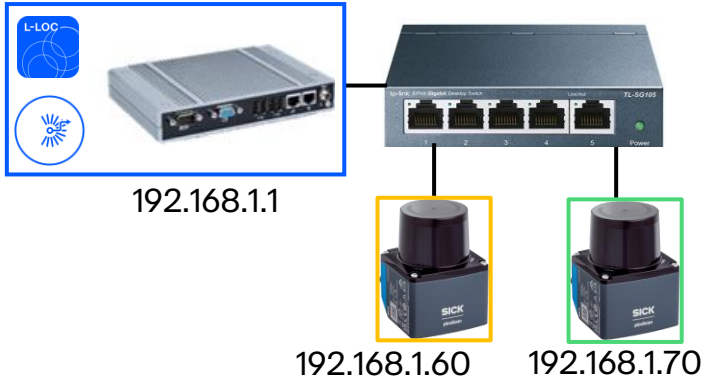
| Measurement data output | | Measurement data output | |
|-------------------------|-------------------------------------|-------------------------|-------------------------------------|
| Format ⓘ | Compact | Format ⓘ | Compact |
| Protocol | UDP | Protocol | UDP |
| Port | 56662 | Port | 56663 |
| Destination IP address | 224.0.0.1 | Destination IP address | 224.0.0.1 |
| Start/stop data output | <input checked="" type="checkbox"/> | Start/stop data output | <input checked="" type="checkbox"/> |

LiDAR settings in SOPASair

| 5 picoscan_front | | 3 picoscan_back (inactive) | |
|---|-------------------------------------|---|--------------------------|
| Name | picoscan_front | Name | picoscan_back |
| Active | <input checked="" type="checkbox"/> | Active | <input type="checkbox"/> |
| Mounted Upside Down | <input type="checkbox"/> | Mounted Upside Down | <input type="checkbox"/> |
| Interface | | Interface | |
| Interface configuration for the sensor. | | Interface configuration for the sensor. | |
| Ip Address | 192.168.1.60 | Ip Address | 192.168.1.70 |
| Port | 2111 | Port | 2111 |
| Receiver Ip | manual | Receiver Ip | manual |
| | 224.0.0.1 | | 224.0.0.1 |
| Receiver Port | manual | Receiver Port | manual |
| | 56662 | | 56663 |
| Max Connection Attempts On Startup | automatic | Max Connection Attempts On Startup | automatic |
| Time Offset | automatic | Time Offset | automatic |

EXAMPLE 13

2 x Scanners, LiDAR-LOC & 2nd App in IPC



PicoScan_front 192.168.1.60

| | | |
|-----------|--------------|--------------|
| LiDAR-LOC | ipAddress | 192.168.1.60 |
| | Port | 2111 |
| | receiverIP | 224.0.0.1 |
| | receiverPort | 56662 |

| | | |
|----------|----------------|-----------|
| SOPASAir | Destination IP | 224.0.0.1 |
| | UDP port | 56662 |

PicoScan_back 192.168.1.70

| | | |
|-----------|--------------|--------------|
| LiDAR-LOC | ipAddress | 192.168.1.70 |
| | Port | 2111 |
| | receiverIP | 224.0.0.1 |
| | receiverPort | 56663 |

| | | |
|----------|----------------|-----------|
| SOPASAir | Destination IP | 224.0.0.1 |
| | UDP port | 56663 |

| No. | Time | Source | Destination | Protocol | Length | Info |
|-------|--------------|---------------|---------------|----------|--------|-------------------------|
| 28337 | 40.460812189 | 192.168.1.1 | 192.168.1.123 | UDP | 98 | 5008 → 5010 Len=56 |
| 28338 | 40.461092353 | 192.168.1.1 | 192.168.1.123 | UDP | 82 | 5008 → 5010 Len=40 |
| 28339 | 40.461310333 | 192.168.1.1 | 192.168.1.123 | UDP | 82 | 5008 → 5010 Len=40 |
| 28340 | 40.461530581 | 192.168.1.1 | 192.168.1.123 | UDP | 82 | 5008 → 5010 Len=40 |
| 28341 | 40.465975068 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28342 | 40.467990311 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28343 | 40.470468287 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28344 | 40.471326947 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28345 | 40.476478833 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28346 | 40.476689217 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28347 | 40.481415788 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28348 | 40.482315476 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28349 | 40.486558051 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28350 | 40.487579575 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28351 | 40.488120763 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28352 | 40.490602494 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28353 | 40.493223689 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28354 | 40.495145849 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28355 | 40.498579108 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28356 | 40.499055592 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28357 | 40.500563032 | 192.168.1.70 | 224.0.0.1 | UDP | 990 | 41485 → 56663 Len=948 |
| 28358 | 40.504178907 | 192.168.1.60 | 224.0.0.1 | UDP | 1500 | 53953 → 56662 Len=1458 |
| 28359 | 40.506604130 | 192.168.1.123 | 192.168.1.1 | HTTP | 678 | POST /api/crown/ViewPro |

LLS Pose

picoscan_front

picoscan_back

EXAMPLE 14

1 x Scanner (CH1 & CH2), LiDAR-LOC & 2nd App in IPC



Settings in SD

Channel 1 Channel 2

Send Mode

- Deactivated
- On request
- On request and also continuously to a target computer (router settings made via "Network settings"):

IP address: 224 . 0 . 0 . 1

UDP port: 6060

Router: 0 . 0 . 0 . 0

Send: Every Measuring

i The maximum data rate also depends on the available network bandwidth, the network load, the device

LiDAR settings in SOPASair

LiDARs (Input) +

1 ns3 ^

Name: ns3

Active:

Mounted Upside Down:

Interface

Interface configuration for the sensor.

Ip Address: 192.168.1.30

Port: 2122

Receiver Ip: manual

224.0.0.1

Receiver Port: manual

6060

Max Connection Attempts On Startup: automatic

Time Offset: automatic

EXAMPLE 14

1 x Scanner (CH1 & CH2), LiDAR-LOC & 2nd App in IPC



nS3 front 192.168.1.40

| | | |
|-----------|--------------|--------------|
| LiDAR-LOC | ipAddress | 192.168.1.30 |
| | Port | 2122 |
| | receiverIP | 224.0.0.1 |
| | receiverPort | 6060 |

| | | |
|-----------------|----------------|-----------|
| Safety Designer | Destination IP | 224.0.0.1 |
| | UDP port | 6060 |

Capturing from enp1s0

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|---------------|---------------|----------|--------|--|
| 13 | 0.008669314 | 192.168.1.157 | 192.168.1.1 | TCP | 60 | 54455 → 80 [ACK] Seq=1 Ack=18417 Win=8212 Len=0 |
| 14 | 0.011303638 | 192.168.1.157 | 192.168.1.1 | HTTP | 670 | POST /api/crown/ViewProperty_LocalizationPong/set HTTP/1.1 (...) |
| 15 | 0.011849013 | 192.168.1.1 | 192.168.1.157 | HTTP | 226 | HTTP/1.1 200 OK (application/json) |
| 16 | 0.028939877 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 17 | 0.029124353 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 18 | 0.029388605 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 19 | 0.029770589 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 20 | 0.029993969 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 21 | 0.030182189 | 192.168.1.30 | 224.0.0.1 | UDP | 201 | 6060 → 6060 Len=159 |
| 22 | 0.036363340 | 192.168.1.1 | 192.168.1.157 | UDP | 98 | 5008 → 5010 Len=56 |
| 23 | 0.058281346 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 24 | 0.058496182 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 25 | 0.058777102 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 26 | 0.058965742 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 27 | 0.059155606 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 28 | 0.059345206 | 192.168.1.30 | 224.0.0.1 | UDP | 201 | 6060 → 6060 Len=159 |
| 29 | 0.065792109 | 192.168.1.1 | 192.168.1.157 | UDP | 98 | 5008 → 5010 Len=56 |
| 30 | 0.067578272 | 192.168.1.157 | 192.168.1.1 | TCP | 60 | 54449 → 80 [ACK] Seq=617 Ack=173 Win=8207 Len=0 |
| 31 | 0.087644883 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 32 | 0.087822219 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |
| 33 | 0.087985715 | 192.168.1.30 | 224.0.0.1 | UDP | 1502 | 6060 → 6060 Len=1460 |

nS3_front

LLS Pose

03

DATA TRANSMISSION EXAMPLES

TCP SCANNER

EXAMPLE 15

1 x Scanner (TCP), LiDAR-LOC in SIM & 2nd App in IPC



General

Addressing Mode:

IP-Address:

Subnet-Mask:

Default Gateway:

Speed: Negotiated:

MAC-Address:

Ethernet Host Port

CoLa Dialect:

Server / Client: IP-Port:

SOPAS ET settings

LiDAR settings in SOPASair

Tim571

Name:

Active:

Mounted Upside Down:

Interface

Interface configuration for the sensor.

Ip Address:

Port:

Receiver Ip:

Receiver Port:

Max Connection Attempts On Startup:

Time Offset:

EXAMPLE 15

1 x Scanner (TCP), LiDAR-LOC in SIM & 2nd App in IPC



TiM571 192.168.1.90

| | | |
|-----------|--------------|--------------|
| LiDAR-LOC | ipAddress | 192.168.1.90 |
| | Port | 2111 |
| | receiverIP | default |
| | receiverPort | default |

| | | |
|----------|----------------|-------------|
| Sopas ET | Destination IP | unnecessary |
| | port | default |

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|-------------|---------------|---------------|----------|--------|--|
| 940 | 1.966487471 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 62306 → 80 [ACK] Seq=1 Ack=1972 Win=8209 Len=0 |
| 941 | 1.966528163 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 54631 → 3389 [ACK] Seq=1 Ack=2915906 Win=8246 Len=0 |
| 942 | 1.966557695 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 62164 → 80 [ACK] Seq=8041 Ack=2237 Win=8207 Len=0 |
| 943 | 1.979251892 | 192.168.1.90 | 192.168.1.1 | TCP | 1514 | 2111 → 37953 [ACK] Seq=95235 Ack=1 Win=362 Len=1448 |
| 944 | 1.979304380 | 192.168.1.90 | 192.168.1.1 | TCP | 1514 | 2111 → 37953 [ACK] Seq=96683 Ack=1 Win=362 Len=1448 |
| 945 | 1.979351348 | 192.168.1.90 | 192.168.1.1 | TCP | 446 | 2111 → 37953 [PSH, ACK] Seq=98131 Ack=1 Win=362 Len=... |
| 946 | 1.979462900 | 192.168.1.1 | 192.168.1.90 | TCP | 66 | 37953 → 2111 [ACK] Seq=1 Ack=98511 Win=714 Len=0 TS... |
| 947 | 1.994668445 | 192.168.1.10 | 192.168.1.1 | UDP | 98 | 5008 → 5010 Len=56 |
| 948 | 2.045750728 | 192.168.1.90 | 192.168.1.1 | TCP | 1514 | 2111 → 37953 [ACK] Seq=98511 Ack=1 Win=362 Len=1448 |
| 949 | 2.045801128 | 192.168.1.90 | 192.168.1.1 | TCP | 1514 | 2111 → 37953 [ACK] Seq=99959 Ack=1 Win=362 Len=1448 |
| 950 | 2.045848276 | 192.168.1.90 | 192.168.1.1 | TCP | 444 | 2111 → 37953 [PSH, ACK] Seq=101407 Ack=1 Win=362 Len=... |
| 951 | 2.045903304 | 192.168.1.1 | 192.168.1.90 | TCP | 60 | 37953 → 2111 [ACK] Seq=1 Ack=101765 Win=714 Len=0 TS... |
| 952 | 2.053993358 | 192.168.1.1 | 192.168.1.123 | TCP | 105 | 80 → 62306 [PSH, ACK] Seq=1972 Ack=1 Win=501 Len=51 |
| 953 | 2.054211170 | 192.168.1.1 | 192.168.1.123 | TCP | 16700 | 80 → 62307 [PSH, ACK] Seq=123265 Ack=1 Win=501 Len=1 |
| 954 | 2.054337806 | 192.168.1.1 | 192.168.1.123 | TCP | 248 | 80 → 62306 [PSH, ACK] Seq=2023 Ack=1 Win=501 Len=194 |
| 955 | 2.054820194 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 62307 → 80 [ACK] Seq=1 Ack=136405 Win=8212 Len=0 |
| 956 | 2.054893622 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 62307 → 80 [ACK] Seq=1 Ack=139911 Win=8212 Len=0 |
| 957 | 2.054982698 | 192.168.1.123 | 192.168.1.1 | TCP | 60 | 62306 → 80 [ACK] Seq=1 Ack=2217 Win=8208 Len=0 |
| 958 | 2.059499401 | 192.168.1.123 | 192.168.1.1 | HTTP | 672 | POST /api/crown/ViewProperty_LocalizationPong/set HT |
| 959 | 2.060195125 | 192.168.1.1 | 192.168.1.123 | HTTP | 226 | HTTP/1.1 200 OK (application/json) |

LLS Pose

TiM571

04

ROS DRIVER CONFIGURATIONS

ROS DRIVERS

sick_lidar_localization.launch example configuration

```
<launch>
  <!-- Launch sick_lidar_localization -->
  <arg name="hostname" default="127.0.0.1"/>
  <arg name="serverpath" default="api"/>
  <arg name="verbose" default="0"/>
  <arg name="udp_ip_lls_output" default=""/>
  <arg name="udp_ip_lls_input" default="127.0.0.1"/>
  <arg name="udp_port_lls_input" default="5009"/>
  <arg name="udp_lls_input_source_id" default="21"/>
  <arg name="udp_port_lls_output" default="5010"/>
  <arg name="udp_lls_output_logfile" default=""/>
  <arg name="software_pll_fifo_length" default="7"/>
  <arg name="odom_topic" default="/odom"/>
  <arg name="ros_odom_to_udp_mse" default="3"/>
  <!-- IP address of the localization controller -->
  <!-- Relative path to the rest api, i.e. url of rest requests is "http://<hostname>/<serverpath>/" -->
  <!-- If verbose>0: print informational messages, otherwise silent except for error messages -->
  <!-- IP address for output UDP messages, or "" for broadcast (INADDR_ANY), default: "", use IP address of your local machine -->
  <!-- IP address for input UDP messages, or "" for broadcast, default: "192.168.0.1", (IP address of the localization controller) -->
  <!-- UDP port of input messages -->
  <!-- Source id of UDP input messages (e.g. source ID of odom sender), has to match the ID in the localization controller configuration -->
  <!-- UDP port of output messages -->
  <!-- Optional logfile for human readable UDP output messages, default: "" (no outputlogfile) -->
  <!-- Length of fifo in SoftwarePLL -->
  <!-- Topic of ros odom messages -->
  <!-- Convert ros odom message to udp: -->
```

NOTE: This launch file is configured for a device running LiDAR-LOC and ROS on the same device.

If the user an external device to run LiDAR-LOC, the “hostname”, “udp_ip_lls_output” and “udp_ip_lls_input” will need to be modified according to the corresponding IP addresses.

[GitHub - SICKAG/sick_lidar_localization · GitHub](#)

ROS DRIVERS

sick_safetyscanners.launch example configuration

UDP port needs to be specified. Port needs to fit the Safety Designer setting.

LiDAR-LOC can bin only to **Channel 1** (Safety Designer), **Channel 2** (Safety Designer) is for other application.

ROS is so-called "zero leading".

→ **Channel 1** of Safety Designer is **channel 0** in ROS

→ **Channel 2** of Safety Designer is **channel 1** in ROS

NOTE: For each safety sensor used, a separate sick_safetyscanner launch file and node needs be created

This launch file is related to examples 6 -8 on this guide.

[GitHub - SICKAG/sick_safetyscanners](https://github.com/SICKAG/sick_safetyscanners)

```
<launch>
<arg name="sensor_ip" default="192.168.1.20" />
<arg name="host_ip" default="192.168.1.1" />
<arg name="interface_ip" default="0.0.0.0" />
<arg name="host_udp_port" default="6070" />
<arg name="frame_id" default="map" />
<arg name="skip" default="0" />
<arg name="angle_start" default="0" />
<arg name="angle_end" default="0" />
<arg name="time_offset" default="0.0" />
<arg name="min_intensities" default="0.0" doc="minimal intensity for a laserscan point" />
<arg name="channel" default="1" />
<arg name="channel_enabled" default="True" />
<arg name="general_system_state" default="True" />
<arg name="derived_settings" default="True" />
<arg name="measurement_data" default="True" />
<arg name="intrusion_data" default="True" />
<arg name="application_io_data" default="True" />
<arg name="use_persistent_config" default="False" />
```

ROS DRIVERS

sick_safetyscanners.launch example configuration for multicasting

Specifying multicast IP address.

UDP port needs to be specified. Port needs to fit the Safety Designer setting.

LiDAR-LOC can bin only to **Channel 1** (Safety Designer), **Channel 2** (Safety Designer) is for other application.

ROS is so-called "zero leading".

→ **Channel 1** of Safety Designer is **channel 0** in ROS

→ **Channel 2** of Safety Designer is **channel 1** in ROS

NOTE:

→ For each safety sensor used, a separate sick_safetyscanner launch file and node needs be created

→ Depending on the IPC's specifications, skipping every 2nd second scan may be necessary to avoid crashes on the ROS driver.

This launch file is meant to use SICK Safety Scanners' **multicasting** function.

This launch file is related to **example 12** on this guide.

[GitHub - SICKAG/sick_safetyscanners](https://github.com/SICKAG/sick_safetyscanners)

```
<launch>
<arg name="sensor_ip"          default="192.168.1.20" />
<arg name="host_ip"           default="192.168.1.1" />
<arg name="interface_ip"      default="0.0.0.0" />
<arg name="host_udp_port"     default="6070" />
<arg name="frame_id"         default="map" />
<arg name="skip"             default="1" />
<arg name="angle_start"      default="0" />
<arg name="angle_end"       default="0" />
<arg name="time_offset"     default="0.0" />
<arg name="min_intensities"  default="0.0" doc="minimal intensity for a laserscan point" />
<arg name="channel"         default="1" />
<arg name="channel_enabled"  default="True" />
<arg name="general_system_state" default="True" />
<arg name="derived_settings" default="True" />
<arg name="measurement_data" default="True" />
<arg name="intrusion_data"  default="True" />
<arg name="application_io_data" default="True" />
<arg name="use_persistent_config" default="False" />
```

Channel 1 Channel 2

Send Mode

Deactivated

On request

On request and also continuously to a target computer (router settings made via "Network settings"):

IP address

UDP port

Router

Send

The maximum data rate also depends on the available network bandwidth, the network load, the device

ROS DRIVERS

sick_safetyscanners – multicasting modification

```
#include <sick_safetyscanners/communication/AsyncUDPClient.h>

...

    // Keep io_service busy
    m_io_work_ptr = std::make_shared<boost::asio::io_service::work>(m_io_service);
    try
    {
        auto endpoint = boost::asio::ip::udp::endpoint(boost::asio::ip::udp::v4(), local_port);
        m_socket_ptr = std::make_shared<boost::asio::ip::udp::socket>(m_io_service);
        m_socket_ptr->open(boost::asio::ip::udp::v4());
        m_socket_ptr->set_option(boost::asio::ip::udp::socket::reuse_address(true));
        m_socket_ptr->bind(endpoint);
        m_socket_ptr->set_option(boost::asio::ip::multicast::join_group(host_ip, interface_ip));
    }

    catch (const std::exception& e)

...

```

In [AsyncUDPClient.cpp](#) make the following changes:

- Replace the code from line 81 to 89, with the code shown on this slide.
- This change on the ROS driver corresponds to example 12 on this guide (nS3 with multicasting).

Note: This change is for ROS1

[GitHub - SICKAG/sick_safetyscanners](#)

ROS DRIVERS

sick_safetyscanners2 – multicasting modification

```
diff --git a/src/communication/UDPClient.cpp b/src/communication/UDPClient.cpp
index b2037e1..08881ea 100644
--- a/src/communication/UDPClient.cpp
+++ b/src/communication/UDPClient.cpp
@@ -76,7 +76,7 @@ UDPClient::UDPClient(boost::asio::io_service& io_service,
                        boost::asio::ip::address_v4 host_ip,
                        boost::asio::ip::address_v4 interface_ip)
    : m_io_service(io_service)
-   , m_socket(io_service, boost::asio::ip::udp::endpoint{boost::asio::ip::udp::v4(), server_port})
+   , m_socket(io_service)
+   , m_packet_handler()
+   , m_recv_buffer()
+   , m_deadline(io_service)
@@ -86,6 +86,10 @@ UDPClient::UDPClient(boost::asio::io_service& io_service,
    LOG_ERROR("Multicast IP specified, however the interface IP is undefined.");
    exit(-1);
}
+ auto endpoint = boost::asio::ip::udp::endpoint{boost::asio::ip::udp::v4(), server_port};
+ m_socket.open(boost::asio::ip::udp::v4());+ m_socket.set_option(boost::asio::ip::udp::socket::reuse_address(true));
+ m_socket.bind(endpoint);
+ m_socket.set_option(boost::asio::ip::multicast::join_group(host_ip, interface_ip));

m_deadline.expires_at(boost::posix_time::pos_infin);
```

Install sick_safetyscanners2 as shown on the git repository.

After installation, the git patch shown on the slide needs to be installed on [GitHub - SICKAG/sick_safetyscanners_base](https://github.com/SICKAG/sick_safetyscanners_base)

Please contact your SICK partner to obtain this patch file since copying and pasting this text may cause formatting issues.

Note: This change is for ROS2

[GitHub - SICKAG/sick_safetyscanners2](https://github.com/SICKAG/sick_safetyscanners2)

ROS DRIVERS

sick_scan_xd: sick_picoscan.launch - example configuration for multicasting

```
<launch>

  <!-- Launch sick_picoscan -->
  <!-- env_name="ROSCONSOLE_CONFIG_FILE" value="/tmp/rosconsole_loglevel_warn.conf" / -->
  <arg name="hostname" default="192.168.1.70"/> <!-- IP address of picoscan150, overwrites default ip address "192.168.0.1" in sick_scansegment_xd.yaml -->
  <arg name="udp_receiver_ip" default="224.0.0.1"/> <!-- UDP destination IP address (ip address of udp receiver), overwrites default in sick_scansegment_xd.yaml -->
  <arg name="nodename" default="sick_picoscan1"/>
  <arg name="publish_frame_id" default="world" /> <!-- frame id of ros Laserscan messages, default: "world <layer-id>" = "world_1" -->
  <arg name="publish_laserscan_segment_topic" default="scan_segment" /> <!-- topic of ros Laserscan segment messages -->
  <arg name="publish_laserscan_fullframe_topic" default="scan_fullframe" /> <!-- topic of ros Laserscan fullframe messages -->
  <arg name="add_transform_xyz_rpy" default="0,0,0,0,0,0"/>

  <param name="udp_port" type="int" value="56662" />

  <param name="host_FREchoFilter" type="int" value="1" />
```

NOTE: This launch file is configured for a device running LiDAR-LOC and ROS on the same device.

To activate the multicast option for this ROS driver, use the assigned IP address “224.0.0.1” and UDP port “56661”.

If two picoScans are used, two launch files must be created and “*nodename*” must be re-labeled, as shown on this example.

An additional modification has to be done in the udp_sockets.h file, which will be shown on the following slide.

This ROS driver example is related to example 11 in this guide.

[GitHub - SICKAG/sick_scan_xd](https://github.com/SICKAG/sick_scan_xd)

ROS DRIVERS

sick_scan_xd – multicasting modification

```
#include "sick_scan/sick_scan_base.h" /* Base definitions included in all header files, added by add_sick_scan_base_header.py. Do not edit this line. */  
  
---  
    // #endif  
    // setsockopt(m_udp_socket, SOL_SOCKET, SO_BROADCAST, &broadcast_opt, sizeof(broadcast_opt));  
    int reuse_addr_opt = 1;  
    setsockopt(m_udp_socket, SOL_SOCKET, SO_REUSEADDR, &reuse_addr_opt, sizeof(reuse_addr_opt));  
    struct sockaddr_in sim_servaddr = { 0 };  
  
---  
    {  
        ROS_ERROR_STREAM("## ERROR UdpSenderSocketImpl::init(" << server_address << ":" << udp_port << "): setsockopt(SO_BROADCAST) failed, error: " << getErrorMessage();  
    }  
    int reuse_addr_opt = 1;  
    setsockopt(m_udp_socket, SOL_SOCKET, SO_REUSEADDR, &reuse_addr_opt, sizeof(reuse_addr_opt));
```

In [udp_sockets.h](#) make the following changes:

- Uncomment “setsockopt(m_udp_socket, SOL_SOCKET, SO_REUSEADDR, ... ;” (line 153) and add a reuse flag on the previous line: int reuse_addr_opt = 1;
- Uncomment “setsockopt(m_udp_socket, SOL_SOCKET, SO_REUSEADDR, &....;” (line 276) and add a reuse flag on the previous line: int reuse_addr_opt = 1;

Note: This solution is valid for ROS1 and ROS2

[GitHub - SICKAG/sick_scan_xd](#)

THANK YOU

→ [SICK.COM](https://www.sick.com)