

## HOW TO...

# CREATE A DATA STREAM CONNECTION TO D-LAB?

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### SUMMARY

D-Lab 3 provides a TCP/IP interface to synchronously record data from any sensor or third party application that is not fully integrated in D-Lab, as long as the sensor/application has the capability to send data via TCP/IP. Thus it makes D-Lab even more flexible as a sensor fusion platform.

### SOFTWARE REQUIREMENTS

D-Lab Connect license and at least D-Lab 3.01 or newer.

### REQUIREMENTS FOR THE SENSOR / APPLICATION THAT SENDS DATA TO D-LAB

This part describes how a client application has to send data to D-Lab using TCP/IP.

Sending Data to D-Lab basically requires a TCP/IP connection. IP address and Port must be configured in D-Lab and used by the client. Here are the basic principles:

1. D-Lab opens a TCP listener (server); external client can open connection to the configured port
2. Data needs to be sent as ASCII String (convert numerical data to string)
3. Data needs to be sent in CSV-Format
  - a. Default delimiter: Tab

- b. Default decimal number format: "point" (modern programming languages use culture specific number formatting: make sure to use invariant formatting)
  - c. Default end of line: Enter
4. Disable buffering during sending (Nagel's Algorithm)

### Example Code in C#

```
// Adjust these values to your requirements
string ipAddress = "127.0.0.1";
int port = 1234;
char valueDelimiter = '\t';
char lineDelimiter = '\n';

// Connect a TCP client. Make sure to disable delay.
using (var client = new TcpClient(ipAddress, port) { NoDelay = true })
{
    // The TCP stream can send byte arrays, so we will convert the values
    using (var stream = client.GetStream())
    {
        while (valuesAvailable)
        {
            // These are some example values
            int value1 = 123;
            double value2 = 12.345;

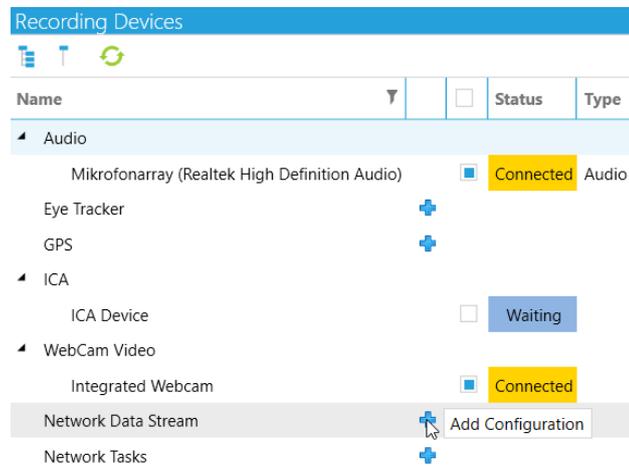
            // Make sure to use invariant culture when converting
            // numerical data to strings.
            string csvValue1 = value1.ToString(CultureInfo.InvariantCulture);
            string csvValue2 = value2.ToString(CultureInfo.InvariantCulture);

            // Format the CSV line and ...
            var csvLine = $"{csvValue1}{valueDelimiter}{csvValue2}{lineDelimiter}";
            // convert it to ASCII byte data.
            var data = Encoding.ASCII.GetBytes(csvLine);

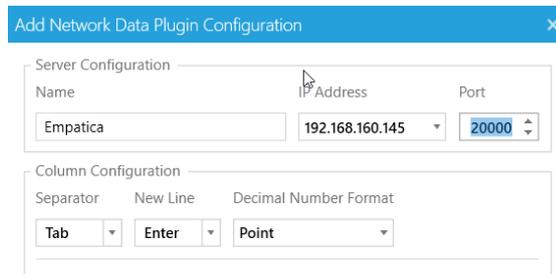
            // Finally send it. You're done.
            stream.Write(data, 0, data.Length);
        }
    }
}
```

## CONFIGURATION IN D-LAB

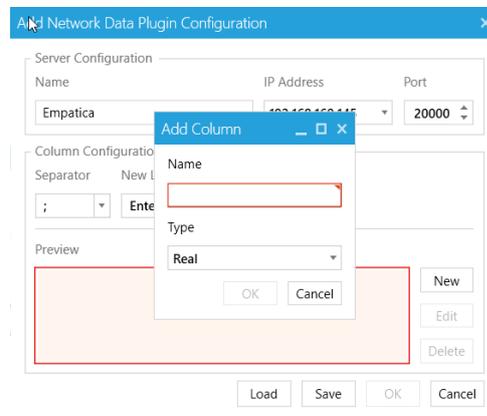
- 1 Add a new Network Data Stream in Plan Mode (Recording Devices)



- 2 Choose a meaningful name for the Data Stream. Select the IP address that should be used for the TCP/IP Connection from the dropdown menu. D-Lab will show all available IP-Addresses of the D-Lab computer (according to the Windows network settings). Select Port to which the client application is configured to send data. Set Colum Configuration in case it is different from the default-settings.



- 3 Configure the channels that are sent by the client. Every channel that is sent needs to be configured in D-Lab. Otherwise, the data is neither shown nor recorded in D-Lab. Create the data channels in the order they are sent by the client application.



- 4 Once the Data Stream has been configured correctly, and a connection has been established successfully, D-Lab will display the appropriate Status “Connected” in the Recording-Devices Window.

In Case of error-messages, please check, if the configuration of the Data Stream matches the configuration in the client application (e.g. number of channels that are sent / expected).

The screenshot shows a software window titled "Recording Devices". It contains a table with columns for Name, Status, Type, and Visualizations. Under a "Network Data Stream" section, a device named "Empatica" is listed with a status of "Connected". Below the device name, several channels are listed, all with a "Real" type.

Name	Status	Type	Visualizations
Network Data Stream			
Empatica	Connected		
x		Real	
y		Real	
z		Real	
BVP		Real	
Battery		Real	
GSR		Real	
IBI		Real	
HBR		Real	
Temp		Real	

## GET HELP

You can find answers to your questions, as well as instructions and troubleshooting information, in Ergoneers FAQ (<http://www.ergoneers.com/faq>).

In case of other questions or hardware problems contact [support@ergoneers.com](mailto:support@ergoneers.com).

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