

# User Manual

*StreamTo*  
*Version 1.16.0*

*January 27, 2022*  
*Build 2*  
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## 1 History

- V1.16
  - Added support for external trigger in. Creates "dummy"-Event based on same timestamp resolution like Ethernet Frames. Frame is formatted as LLC with MACSrc=0x000000 and LLC-Protocol=0x1234.
  - Optimized ts2av in case of video-bandwidth is bigger than available bandwidth on USB-Raw Adapter. Instead of stop due to USB buffers full, all buffers will be purged and video continues while skipping these frames. On VLC, or other video decoder, video will "jump" as result of missing blocks in received stream.
  - Play-Pcap files skips recorded Trigger-Events.
- V1.14
  - Added support for external trigger in. Creates "dummy"-Event based on same timestamp resolution like Ethernet Frames
  - Optimized ts2av in case of video-bandwidth is bigger than available bandwidth on USB-Raw Adapter.  
In case of buffer full, all buffers will be purged and video continues while skipping frames these frames. On VLC or other video decoder, video will "jump" as missing parts in received stream.

## 2 Usage

StreamTo is a console tool running on MS-Windows or Linux based USB-Host computers. At least one USB OABR-Stick Raw must be connected and latest `broadway2_api` must be already installed as described in `broadway2` user manual.

The `streamto` tool supports:

- FC611 - USB 100T1 Adapter Raw (TJA1100MRA4)
- FC612 - USB 100T1 Adapter Raw (TJA1101A/TJA1101B)
- FC631 - USB 10T1L Adapter Raw (ADIN1100)

## 3 Overview

StreamTo supports following use-cases.

- Stream mpeg-4 ts-files from file to Layer2 as AVTP
- Receive Ethernet Layer2 stream and convert to Layer3 RTP
- Receive Ethernet Layer-2 frames and save them as pcapng files
- Replay Ethernet Layer-2 frames from pcapng files

For build-in help simply enter:

```
> streamto -h
```

### 3.1 File to AVTP stream

With this command, a recorded ts-file can be used as source and stream AV contents on Ethernet Layer2. Means, would replace an AVTP Ethernet camera and enables a pre-defined stream for validation and verification of video monitors and decoders connected direct to Automotive Ethernet Layer2.

Open the specified H.264/H.265 TS file and send contents as IEEE P1722 AVTP compliant stream.

```
> streamto ts2av <ts-file>  
  [-u <unique_id>]  
  [-m <desination_mac_address>]  
  [-vtci <number>]  
  [-l]  
  [-d <device_instance>]
```

Options:

```
-h --help  
  Display this help text and exit.  
-v --verbose  
  Enable verbose mode.  
-d --device_instance  
  Zero-based index of the device instance to use, default 0.
```

```
-u --unique_id <ID>
    Unique ID used in the IEEE 802.1Qat stream ID, default 0.
-m --mac_address <MAC address>
    Source/destination MAC address specified as string with
    12 characters (e.g. '112233445566').
    Defaults to FF-FF-FF-FF-FF-FF (the broadcast address) if
    this option is not specified.
-vtci --vlan_tci <number>
    Specifies the VLAN tag control information (TCI) for the
    sent Ethernet frames, zero for no VLAN (default).
-l --loop
Rewind the file to the beginning when end of file is reached.
```

**Please note:**

Using FC631 with only 10MBit bandwidth, video transmission may lead to buffer overrun. In that cases, buffer will be cleared and transmission continues. On video viewer side, e.g. VLC, this may lead to block-jumps/skipping scenes.

Remove video resolution or try to upgrade using 100Base-T1 (FC612) for higher bandwidth video streaming.

## 3.2 AVTP stream to RTP

Receive an IEEE P1722 AVTP compliant stream, convert it to an RTP/UDP stream, and forward it to the specified host. For simplest usage, using local-host as destination, will enable to run VLC MediaPlayer on given RTP port to decode and show received Layer2 AVTP streams.

```
> streamto av2rtp <destination_host>
    [-u <unique_id>]
    [-m <source_mac_address>]
    [-p <port_number>]
    [-d <device_instance>]
```

Arguments:

<destination\_host> target ip-addr on TCP/IP. Default port is 5000

Options:

`[-u <unique_id>`  
Unique ID used in the IEEE 802.1Qat stream ID, default 0.  
`[-m <source_mac_address>]`  
MAC address specified as string with 12 characters  
(e.g. '112233445566'), default 0xFFFFFFFFFFFF  
`[-p <port_number>]`  
Port number to be used, default 5000.  
`[-d <device_instance>]`  
Zero-based index of the device instance to use, default 0.

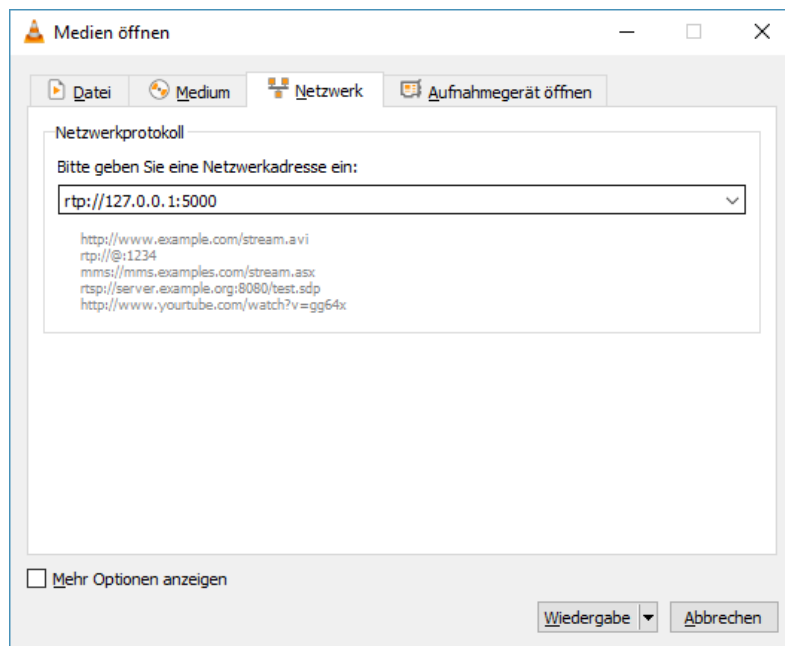
### 3.3 RTP to VLC Media Player

Requires installed VLC Media Player. VLC Media Player is available for Windows and Linux.

Famous and well known open-source Video LAN tool can be downloaded here:

<https://www.videolan.org/vlc/index.de.html>

As streamto supports the conversion from received AVTP Layer2 streams to standard Layer3 RTP protocols, VLC Media Player needs just to be configured for receiving this RTP network stream to decode and show it.



### 3.4 PCAPNG

As USB-Raw-Adapters are not installed as network devices, network analysis tools like Wireshark cannot be used directly. In daily usage and most common for high bandwidth data, recording to file and verify data later is even better. This feature will bring more enhanced features for 100Base-T1 networks. The USB-Raw-Adapters FC611,FC612 can be used to record precise timestamped Layer-2 frames and write them in pcapng file format. These files can be opened with Wireshark for offline analysis. In difference to standard USB network devices, timestamps have full nanoseconds resolution of HW-MAC inside the adapter. This avoids USB latency/jitter for precise measurements. Another option using USB-Raw-Adapters is easier multi-instance support to connect to 100Base-T1 switches and record multiple sessions for each port.

New feature in V.16 is support for external Trigger-In Events which will generate Dummy-Frames (MAC-Source = 0x000000) and LLC-Type 0x1234. Each Trigger-In on USB Raw-Stick generates precise timestamp taken from HW-MAC.

#### 3.4.1 Recording

Capture Ethernet frames and write them to a .pcapng file. Suffix .pcapng will be appended to the specified filename.

```
> streamto pcap <filename>
  [-fbs <frames>]
  [-maxkb <size> | -maxmb <size>]
  [-d <device_instance>]
```

Arguments:

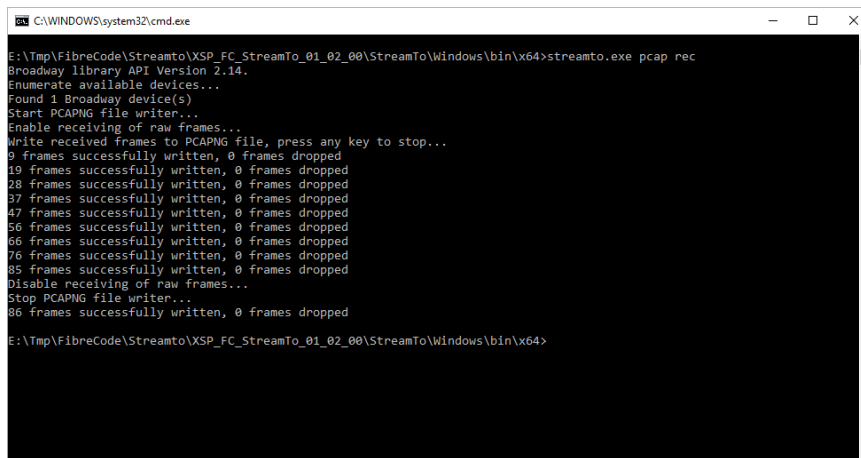
<filename> filename for pcapng-file. In case of using .max options, will be basename with incremented numbers.

Options:

```
[-fbs --frame_buffer_size <frames>]
Size of the intermediate buffer in frames, default 20000 frames.
[-maxkb --max_file_size_KB <size>]
Max size of a pcap-ng file in kilobytes \
```

```
(1'000 bytes), zero for no limit (default).
[-maxmb --max_file_size_MB <size>]
Max size of a pcap-ng file in megabytes \
(1'000'000 bytes), zero for no limit (default).
```

Example to use streamto recording on connected adapter with friendly name "orange".



```
C:\WINDOWS\system32\cmd.exe
E:\Tmp\FibreCode\Streamto\XSP_FC_StreamTo_01_02_00\StreamTo\Windows\bin\x64>streamto.exe pcap rec
Broadway library API Version 2.14.
Enumerate available devices...
Found 1 Broadway device(s)
Start PCAPNG file writer...
Enable receiving of raw frames...
Write received frames to PCAPNG file, press any key to stop...
 9 frames successfully written, 0 frames dropped
19 frames successfully written, 0 frames dropped
28 frames successfully written, 0 frames dropped
37 frames successfully written, 0 frames dropped
47 frames successfully written, 0 frames dropped
56 frames successfully written, 0 frames dropped
66 frames successfully written, 0 frames dropped
76 frames successfully written, 0 frames dropped
85 frames successfully written, 0 frames dropped
Disable receiving of raw frames...
Stop PCAPNG file writer...
86 frames successfully written, 0 frames dropped
E:\Tmp\FibreCode\Streamto\XSP_FC_StreamTo_01_02_00\StreamTo\Windows\bin\x64>
```

After recording sessions are finished, just use Wireshark and open recorded .pcapng files.

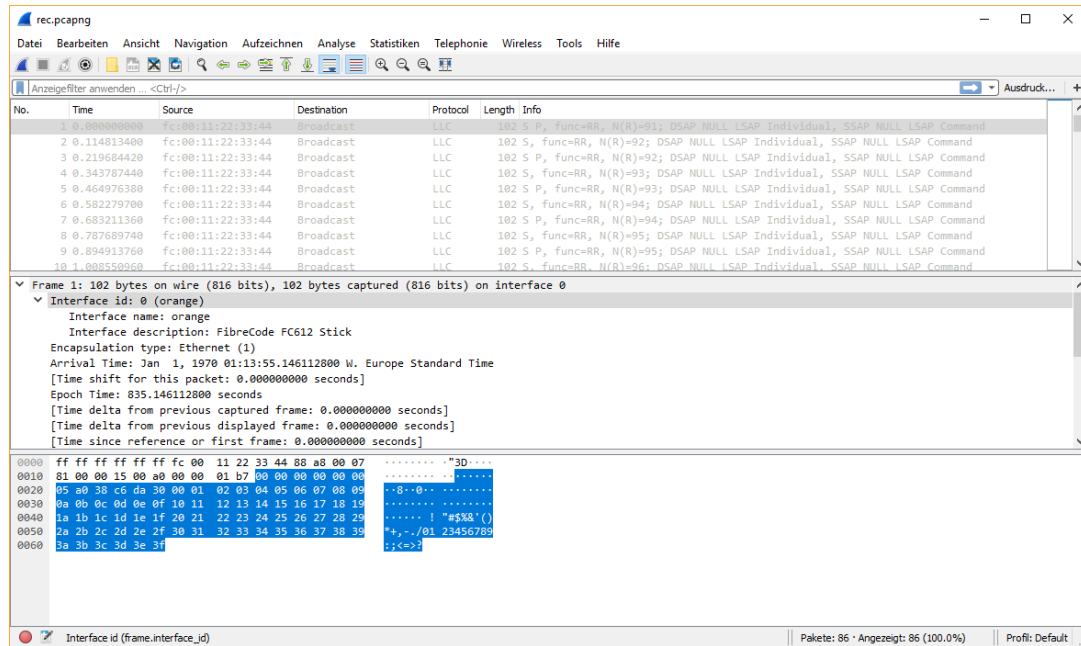
As shown in Wireshark screen-dump, interface name is "orange". This is a pretty helpful feature when using multiple adapters connected to Automotive Ethernet switches.

Following picture shows recording of trigger-input events received at Trigger-In Pin of FC612.

### 3.4.2 Replay

Starting with StreamTo V1.12, also replay of Ethernet frames is available. With this feature, different pcapng-files can be used to get pre-defined traffic on each node.

```
> streamto playpcap <filename>
[-flsm <frames>]
[-fbs frames]
[-l]
```



```
[-d <device_instance>]
[-n <device name>]
```

Arguments:

<filename> filename for pcapng-file to be used for stream-out.

Options:

```
[-fbs --frame_buffer_size <frames>]
```

Size of the intermediate buffer in frames, default 20000 frames.

```
[-flsm --force_local_source_mac]
```

In each Ethernet frame, replace the source MAC address with the one of the local device.

```
[-l --loop]
```

Rewind the file to the beginning when end of file is reached.



