



edf2bids

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An open-source software to sort EDF/EDF+ files into a BIDS compliant structure	
! [drawing] (./img/main_gui.png)	

European Data Format (EDF)

The European Data Format (EDF) is a simple and flexible format for exchange and storage of multichannel biological and physical signals. It was developed by a few European medical engineers who first met at the 1987 international Sleep Congress in Copenhagen. In March 1990, they agreed upon a very simple file format to exchange their sleep recordings. This format became known as the **European Data Format**.

An extension of EDF, named EDF+, was developed in 2002 and is largely compatible to EDF. However, the EDF+ format provides a few advantages: the files can contain interrupted recordings, annotations can be stored within the file along with stimuli/events. Medical type recordings often contain annotations about patient events, stimulation responses and are often discontinuous as the patient may require breaks during recording time. EDF+ allows for these medical type recordings to be stored much easier.

The full specifications can be found on the EDF website. The site also supports users and developers by offering free downloads of files and software, a list of EDF(+) compatible companies and further contact possibilities.

EDF File Structure

EDF/EDF+ files consist of a header (ascii) that describes the contents of the file and the experimental settings. The data (int16) are stored after the header.

The Header

The EDF/EDF+ header is split into two parts: measurement info and channel info. The measurement info contains general information about the recording while the channel info contains specific information about each channel used to record. Thus, the length of the full header (the 'header record') equals:

measurement info (256)+ channel info (number of channels * 256)

The header record is ascii only, and contains the following fields:

Measurement Info The first 256 bytes in an EDF/EDF+ file is allocated to the measurement info (i.e. patient info,

date and time of data acquisition, etc.).

Field	Size	Position	Notes
version	8	0	version is always 0
patient id	80	8	Code Sex DOB Name1
recording id	80	88	Startdate start_date ExpID InvestigID
startdate	8	168	dd.mm.yy
starttime	8	176	hh.mm.ss
number of bytes in header	8	184	
reserved	44	192	EDF: empty EDF+: EDF+C for continuous;EL
number of data records	8	236	nr
duration of data record	8	244	in seconds
number of signals	4	252	ns
total	256		

??? note "1 patient id" * **Code:** hospital subject code *
Sex: F or M * **DOB:** birthdate in dd-MMM-yyyy * **Name:** the
patients name

****e.g. `MCH-0234567 F 02-MAY-1951 Haagse_Harry`****

??? note "2 recording id" * **Startdate:** the text Startdate *
start_date: start date itself in dd-MMM-yyyy * **InvestigID:**
a code specifying the technician/clinician * **Equipment:** a
code specifying used equipment

****e.g. `Startdate 02-MAR-2002 PSG-1234/2002 NN Telem03`****

Channel Info The channel info record is 256 bytes and each channel has its own channel info record. For instance, if 10 channels are used to record then there would be 10 * channel info records within the EDF/EDF+ header. For each channel, the following information is stored:

Field	Size	Position	Notes
label	16	0	
transducer	80	16	transducer type (i.e AgAgCl electrode)
physical dim	8	96	physical dimension of channel data (i.e. μ V)
physical min	8	104	
physical max	8	112	
digital min	8	120	1
digital max	8	128	1
prefiltering	80	136	high-pass, low-pass and notch filters2
number of samples	8	216	
reserved	32	224	

Field	Size	Position	Notes
total	256		

??? note "1 digital min/max" * digital range must be somewhere between -32768 and 32767 (because data samples are 16-bit signed integers)

??? note "2 prefiltering" * **HighPass:** HP * **LowPass:** LP * **Notch:** N

****e.g. `HP:0.1Hz LP:75Hz N:60Hz`****

After the channel info header blocks there are 256 bytes for each channel acquired.

each field in the channel info record holds the values for all channels (rather than the header storing one full channel record, then a second full channel record, etc). That is, if e.g. two channels are acquired, then there will be two consecutive `label` fields (16 + 16 bytes), then two consecutive `transducer` fields (80 + 80 bytes), then two `physical dim` fields (8 + 8 bytes), etc.

Data Record

Data records follow after the header record. Here, data samples (of type int16) are stored in blocks ('data record'). Each block contains the samples acquired during a period of time specified in the header as duration of data record, and the total number of blocks in the file are number of data records.

Note that EDF allows the acquisition of signals at different sampling rates; the number of samples per signal in each data block is in the signal header as `number of samples in data record`.

For example, two signals signal_A and signal_B are acquired at 100 Hz and 5 Hz respectively. The data are saved every 20 seconds (duration of data record = 20). Thus, one block of data (a data record) will consist of 2000 samples (number of samples in data record = 100 Hz * 20 secs = 2000) from signal_A followed by 100 samples (number of samples in data record = 5 Hz * 20 seconds = 100) from signal_B. If the header indicates that there are 70 such blocks (number of data records = 70), then the total duration of the recording would be 70 x 20 = 1400 seconds (number of data records * duration of data record).

EDF File Structure Diagram

Installation

There are a few ways to install **edf2bids**. For those looking to simply run the software you should install a compiled version.

Obtain pre-compiled versions

Windows For 64-bit Windows, compiled version can be found in this google drive folder. Make sure to download the latest version, the zipped folders contain the date of compiling.

Compile from source

The source code can be download from the GitHub repository.

Python Setup

First you will need to install Python, depending on what operating system you are using there are different approaches.

Windows

1. You will need to download the windows python installer.
2. Underneath the heading at the top that says Python Releases for Windows, click on the link for the Latest Python 3 Release - Python 3.x.x
3. Scroll to the bottom and select either Windows x86-64 executable installer for 64-bit or Windows x86 executable installer for 32-bit
4. Install by double-clicking on the downloaded file.

Mac

1. Install Homebrew by opening a Terminal window and pasting the following line.

```
/usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"
```

2. Homebrew asks you to enter your password so it can finalize the installation. Enter your user account password and hit enter
3. Once Homebrew has finished installing, return to your terminal and run the following command:

```
brew install python3
```

Linux

1. Open a terminal window and run the following commands:

```
sudo apt-get install python3.6
sudo apt install python3-pip
```

Compiling

Other Useful Software

EDFBrowser

EDFBrowser (developed by Teunis van Beelen) is a free, open-source, viewer/toolbox for EEG/IEEG data. It is a great tool to use when attempting to organize your input directory for **edf2bids**.

Windows For 64-bit windows download this file.

For 32-bit Windows download this file.

Mac You can download the latests .dmg file from this website.

Linux To install on Linux, you must first have the dependencies installed (g++, Qt5):

```
sudo apt-get update
sudo apt-get install g++ make git qtbase5-dev-tools qtbase5-dev qt5-default
```

Then enter the following commands to download and install:

```
git clone https://gitlab.com/Teuniz/EDFbrowser.git
cd EDFbrowser
qmake
make -j4
sudo make install
edfbrowser
```


Overview

This section describes steps required to use **edf2bids**. If you have not installed **edf2bids** you have two options:

- Install a compiled version
- Compile from source code

The following steps should be taken sequentially:

1. **Export data from Natus**
2. **Organize your input directory**
3. **Check EDF file type**
4. **Adjust software settings**
5. **Confirm input directory data**
6. **Confirm output directory data**
7. **Check output folder data**
8. **Convert/Upload data to SPReD** [EpLink study only]

EpLink Study Workflow

template: overrides/main.html **title:** Definitions

Filename terms

Throughout this documentation the following filename terms will be used:

term	definition
sub_num	specific subject number
visit_num	each stay within the hospital (2 digits)
ses_num	each day spent in hospital during the visit (2 digits starting with SE,
type	type of data collected (should be _IEEG/_EEG)
task	format of the edf data (should be _CLIP/_FULL/_CS)
RET	if included, indicates the study is retrospective 1

1 if not present then study assumed to be prospective (PRO), so you do not need to include this flag for prospective sessions

!!! note "Note on Visit Numbers" * If any retrospective studies exist for a subject, they should be assigned the first visit number 01 * All following admissions to the

hospital would be given incremental visit numbers (i.e. visit 2: 02, visit 3: 03) * Two separate admissions to the hospital should not have the same visit number * Scalp and Intracranial recordings should have distinct visit numbers (ex. If 01 is used for the participant's first stay in the EMU for scalp EEG, 02 should be used if they come back for intracranial EEG)

!!! note "Note on Session Numbers" If a day in sequence of sessions is missing/not present this session number should still be accounted for e.g. sh ses-001 (data present), ses-002 (data missing), ses-003 (data present) The directory naming would look like: sh sub-003_01_SE01_IEEG_FULL_RET sub-003_01_SE03_IEEG_FULL_RET Notice that no folder is specified for the missing ses-002 but the number is still accounted for by skipping it.

edf2bids terms

Within the edf2bids software, the columns present within the input/output windows are:

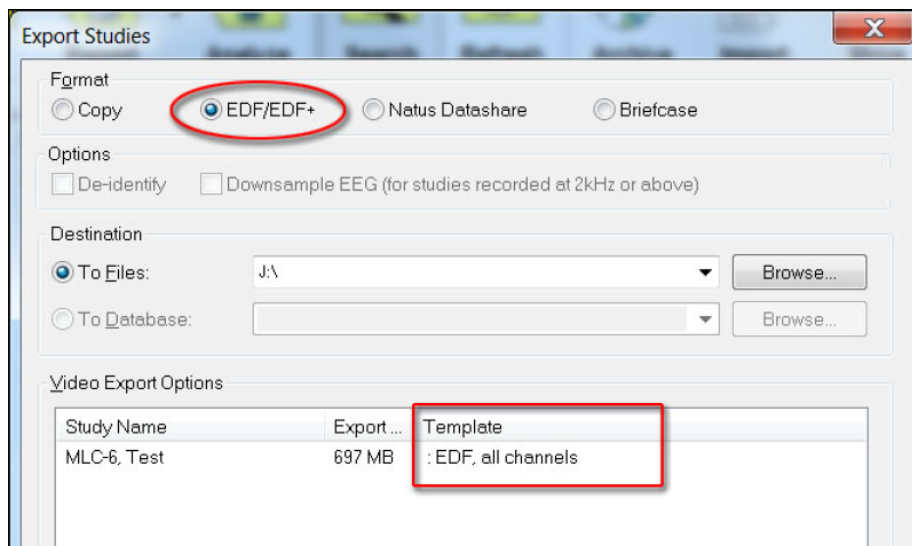
term	definition
Name	this is the name of the subdirectory within the patient folder
Date	the date the data was recorded
Time	the time the data was recorded
Size	the size of the EDF/EDF+ file in gigabytes
Frequency [modifiable]	the frequency the data was recorded at. This is automatically set to 500 Hz
Duration	the total duration of the EDF/EDF+ file recording, which is in seconds
EDF Type	type of EDF+ file (EDF+D/EDF+C). This field should always be EDF+D
Type [selectable]	the type of EEG data collected (Intracranial or Scalp). This field should always be Scalp
Task [selectable]	the condition of the recorded file: Full, clip or cortical
Ret/Pro [selectable]	whether the data file is retrospective or prospective. This field should always be Retrospective
Channel File	this indicates if a channel_labels.txt file was found. If yes, it will be used for channel naming
Imaging Data	this indicates if an imaging directory was found in the root of the data folder

It is a good idea to determine all the headboxes used to collect EEG/iEEG data at your institution. Once known, you will only need to create one template for each headbox.

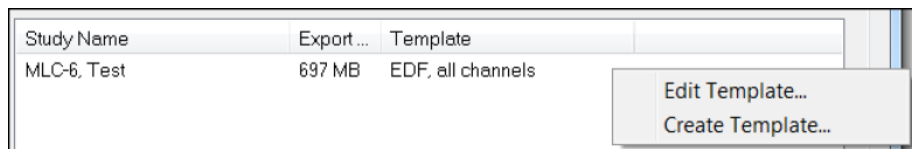
1. In Natus Database, select (highlight) the study patient you want to export (if a patient has used two different headboxes then you will need to make/use a different template for each one).
2. Choose **Administration** > **Export**. Alternately, you can right-click and select **Export...** from the context menu.

The **Export Studies** dialog opens.

- Before selecting the **Export** button, ensure that **EDF/EDF+** on the open dialog is selected. The list of studies will update to include a **Template** column.



- Right-click on the displayed information for the study. The context menu displays showing the options available. From the context menu, you can choose one of the following:



- * **Edit Template:** Edit an existing, selected template
- * **Create Template:** Create a new template based on the headbox type

a new template is not required for each export. You will only need to create one template for every headbox used at your institution. See the sections below on creating and modifying export templates.

- From the context menu in the **Export** dialog, select **Create Template**. The **EDF Template Editor** dialog displays showing the **Channels** Tab.

Channels Tab

! [drawing] (img/natus_03.png)

- Give the template a new name by typing it in the Name box. Ideally create one template for every headbox used at

your center. To ensure the templates are not modified or deleted at your center we suggest adding eplink to the template name (i.e. eplink_eeg_128_template or eplink_quantum_template).

2. The Channels tab dialog allows for the selection of the channels that will be exported in the EDF file, as well as the definition of those channels.
 - Raw Data (check this box for EpLink): this option exports the study data with no montage associated.
 - Acquisition Montage (ignore): this option exports the study data using the patient's montage.
 - Montage (ignore): this option exports the study using a compatible montage based on headbox and study type. This can be chosen from the available dropdown menu.
3. For EpLink select **Raw Data**.
4. Select the checkbox **Add Patient Event** Channel to include this channel in the export. You do not need to select **Add Trigger Channel**.

Options Tab

![drawing](img/natus_04.png)

1. Select the Options tab to modify the various options associated with exporting the studies to EDF/EDF+.
2. Select the EDF+ radio button to choose the format of the export.
3. Choose the desired File Extension (.EDF) from the dropdown.
4. Do not check the Deidentify Patient Information checkbox. This information will be removed by the conversion software and the patient name is needed in order to remove any potential traces of it from the EDF file, including any annotations. The conversion software will be run before the EEGs are uploaded to Brain-CODE so EEGs will still be de-identified before leaving the site.
5. When the EDF+ option is selected, the Pad Gaps with Zeros checkbox is enabled. Select this checkbox so gaps in the recording will be filled with zeros. This ensures the EDF+ file is continuous. EDF+ supports

gaps (disconnects) in the studies, however this makes analysis more difficult as timepoints will be shifted.

6. Select the checkbox next to Invert AC Channels to invert the polarity of the AC channels when the study is exported.
7. We will not select anything in the File Size Limitations box.
8. Click the Save button on the Channels tab prior to clicking OK in order to save the template. Ensure you remember the name of the template for use later.
9. Once saved, you can close the EDF template Editor dialog.

once you have saved a headbox template, if another patient uses that headbox then the template you created will automatically be selected by Natus for the subsequent patient.

Saving channel labels

1. In Natus Database, double-click any study for patient you want to export.
2. When the study loads in the viewer, select the first Montage event in the annotations window on the left. This will ensure you are at the point in the recording that the montage was set for the patient.
3. Choose **Edit > Settings** and select the **Channel Labels** tab.
4. Select the From Montage button. This will load the channel labels used for the patient. Select all the labels and save them within a text file called "channel_labels.txt".

Single EDF export

1. In Natus Database, select (highlight) the study patient you want to export.
2. Choose **Administration > Export**. Alternately, you can right-click and select **Export...** from the context menu. The **Export Studies** dialog opens.
3. Before selecting the **Export** button, ensure that **EDF/EDF+** on the open dialog is selected. The list of studies will update to include a **Template** column.

4. Confirm the template chosen matches the headbox used for that study. If the template is not correct, click on the template name and select the appropriate headbox template.
5. Once you have confirmed the correct headbox template select **Export**.

Batch EDF export

Before running the Natus EDF batch export, you will need to locate three items.

1. **EDF Export Template:** This is the template you saved for the specific headbox.
 - Find the installation directory for the **Natus** software. The directory name will be **Neuroworks** and it is usually found at C:\Neuroworks or D:\Neuroworks. Within this directory select the **Settings** directory. Finally, find the **EDF Export Template** you saved previously, it will be the name you chose with the extension **.exp**.
 - Ensure you are selecting the correct template for the specific patient. Within the Natus database, search for the patient and make a note of the headbox that was used for that patient (this is found in a column to the far right of the main window)

The template file needs to remain in the Neuroworks\Settings directory. If you attempt to run the conversion with a template path outside this directory it won't run.
2. **EDFExport.exe:** This is the executable you will use to run the batch export of EDF files.
 - This executable will be found within the installation directory for the **Natus** software.
 - Usually the full path will be located at: C:\Neuroworks\EDFExport.exe or D:\Neuroworks\EDFExport.exe.
3. **Source Patient Data Directory:** If you haven't exported the subjects data from Natus yet, you can use the Natus database storage path to find the subject and avoid having to export from Natus first.
 - **Natus** stores the raw data for every patient on a Network drive (see figure below). Most often the

drive will be Z:\. You will need to determine where this location is on your system. Right click on the **Windows Start Menu** and select **File Explorer**.

Create study path text file

1. Navigate to the Natus data storage drive. Once in that directory you can now search for the subjects name (Lastname Firstname) in the search box at the top right of the File Explorer window. You can press the red X to stop the search if it seems to be going on forever. The search results up to that point will not be removed if you stop the search.
2. Sort the subjects folders by selecting Date Modified at the top. This will organize the subjects folders from newest to oldest.
3. Right click on the computer desktop select **New > Text Document**. Rename the text document to match the subject you will be exporting.
4. Open the text document. Each line should be the full path the specific study you want to export for the subject. In the Natus patient directory folder, start at the oldest study folder by scrolling to the bottom. If multiple folders exist on the same day, hover the mouse over each folder to determine the size (iEEG data is typically ~20-25 gb in size).
5. Once you have determined the right directory, open the directory and find the **.eeg** file (usually at the top). If you right click on the search bar you can copy the directory path and paste it into the text file. Then copy the filename of the **.eeg** and add that to the text file as well to complete the path. You can also right click on the file select **Properties** and copy the full path from the window that opens.
6. Repeat steps 2-4 for all study dates for the subject.
7. Save the text document and close it.

Running batch export

1. Now it is time to run the batch conversion. Click on the Windows start menu and search for **Command Prompt**. Double click to open a command prompt window.

2. You will now enter the command to perform the conversion, using the information you have previously gathered.
3. **Input 1:** Type the full path to where you found the EDFExport.exe within quotations:
4. **Input 2:** Press the spacebar and type **-f**, followed by another space and the path to where the subject text document is located that you created. Put the path within quotations:
5. Lastly, you need to specify where you want the exported EDFs to go. Create a new folder on your encrypted hard drive for this export and copy the full path to that directory.
6. **Input 3:** In the command prompt, enter a space after the path for the text document then enter **-o** and another space followed by the full path to the output directory. Again, ensure you place the path within quotations:

In the command prompt window, the function will look like:
7. Once you have entered the full command hit the Enter key to begin conversion. For a 25gb file, the conversion will take ~15mins. Return in a few hours to check on the conversion

Input Directory Setup

This section outlines how the data should be organized prior to running the **edf2bids** software. The data files should be in EDF/EDF+ format following the specifications provided by the EDF format developers.

Setup a working directory is a recommended way to organize your working directory of data (this is optional but highly recommended).

Option 01: Do not specify visit/session number should be followed if you do not have a specific naming convention for visits and sessions. In this option, the visit and session number are not supplied to the **edf2bids** software and instead are calculated based on the date/time of the EDF/EDF+ acquisition.

Option 02: Specify visit/session number should be followed for data from the **EpLink study**.

At this moment the names of the EDF/EDF+ files are not yet BIDS compliant, but they do contain some metadata in the filename that will be used later.

Setup a working directory

It is recommended that you establish a working directory to ensure your data remains organized. The optimal setup would be one with 4 directories:

- **unorganized**: this directory holds unorganized subject data ready to be organized for **edf2bids**
- **organized**: this directory holds organized subject data ready to be organized for **edf2bids** (according to either option below)
- **input**: this directory holds subject data ready to be converted with **edf2bids**
- **output**: this directory holds the output converted data from **edf2bids**

!!! warning When beginning a conversion with **edf2bids** ensure the **output** directory is empty and the **input** directory only contains the subject folders you wish to convert.

Example

```
working_dir/  
  unorganized/  
  organized/  
  input/  
  output/
```

Option 01: Do not specify visit/session number

If you do not need to specify the visit or session number for each EDF file for the subjects, then this option will assign session numbers based on the **Date** timestamp within the EDF files. So the earliest EDF file will be given **ses-001** while the latest EDF file will be given **ses-###** (### will be equal to the number of EDF files for that subject).

!!! important "Input directory" The input directory (input) should contain a sub-directory for each of the subjects you want to have converted (i.e. input\sub-001, input\sub-002 etc.). Within the **edf2bids** software you select input as the input directory and not the individual subject directories

Example

for a complete list of terms see the [definitions page](02_definitions.html#filename-terms)

```
input/
<sub_num>/
  X-X_432a35cf-adg25-462-24aa-325db4e5e2d3.edf      # Individual subject directory
  X-Xe_7d22151a-ac455-3adc312b-426aae3251ac.edf      # Individual EDF files

<sub_num>/
  X_X_35a1ed7a-7764-4cb0-8571-51026e3dbef4.edf      # Individual subject directory
  X_X_e515c5ac-6301-4acd-8a69-fb208d5fd097.edf      # Individual EDF files
```

Option 02: Specify visit/session number

In some instances you may want to manually assign the specific visit or session numbers for the EDF files. In this scenario you would need to place each EDF file into a directory with the following naming scheme:

```
<sub_num>_<visit_num>_<ses_num>_<type>_<task>_[RET]
```

for a complete list of terms see the [definitions page](02_definitions.html#filename-terms)

```
sub-003_02_SE01_IEEG_FULL_RET
```

A folder with the above naming scheme would indicate this is subject 3's second visit and first session. The data collected was a full IEEG recording that was retrospective (recorded prior to the subject consent).

!!! important "Input directory" The input directory (input) should contain a sub-directory for each of the subjects you want to have converted (i.e. input\sub-001, input\sub-002 etc.). Within the **edf2bids** software you select input as the input directory and not the individual subject directories

Example

Each day of recording should be in a separate folder within the subject directory:

```
input/
<sub_num>/                                # Individual subject
    directory

    <sub_num>_<visit_num>_<ses_num>_<type>_<task>_[RET]/ # Specify visit, session,
    type, and task

    X-X_432a35cf-adg25-462-24aa-325db4e5e2d3.edf      # Individual EDF files
    X-Xe_7d22151a-ac455-3adc312b-426aae3251ac.edf     # Individual EDF files

    <sub_num>_<visit_num>_<ses_num>_<type>_<task>_[RET]/ # Specify visit, session,
    type, and task

    X-X_432a35cf-adg25-462-24aa-325db4e5e2d3.edf      # Individual EDF files

<sub_num>/                                # Individual subject
    directory

    <sub_num>_<visit_num>_<ses_num>_<type>_<task>_[RET]/ # Specify visit, session,
    type, and task

    X-X_432a35cf-adg25-462-24aa-325db4e5e2d3.edf      # Individual EDF files
    LastName~ FirstName_7d22151a-ac455-3adc312b-426aae3251ac.edf # You can
    include the subject first/last name to be used when de-identifying the data
```

Imaging Data

edf2bids will anonymize imaging DICOM files if they are present within the input directory. The DICOMs should be within a directory named **imaging**, which is at the root

of the subjects directory. Within the **imaging** directory should be another directory with the desired output name for the zipped directory (containing all the anonymized DICOMs). The directories containing the actual DICOM files can be given any name, generally they are named after the specific sequence acquired for the DICOMs inside.

Example

```
input/
<sub_num>/                                # Individual subject directory
  X-X_432a35cf-adg25-462-24aa-325db4e5e2d3.edf  # Individual EDF files
  X-Xe_7d22151a-ac455-3adc312b-426aae3251ac.edf
  <imaging>/                                # Imaging directory for dicoms
    <sub_num>_<visit_num>_<ses_num>/          # session directory for dicoms,
    this name will be given to output zipped folder
    T1w_scan/<*.dcm files>                  # DICOM directories, can be given
    any name
    T2w_scan/<*.dcm files>
    dwi/<*.dcm files>
```

Check EDF Type

for a detailed explanation of the EDF format see the [description page](../index.html#edf-file-structure)

EDF Type Overview

Only EDF+ files can be stored in either a continuous (EDF+C) or discontinuous (EDF+D) format, while EDF files can only be continuous. A discontinuity within the EDF+ file would occur when the recording is stopped and subsequently started again, resulting in a lapse in recording time. There are two ways to account for the missing data during the non-recording period:

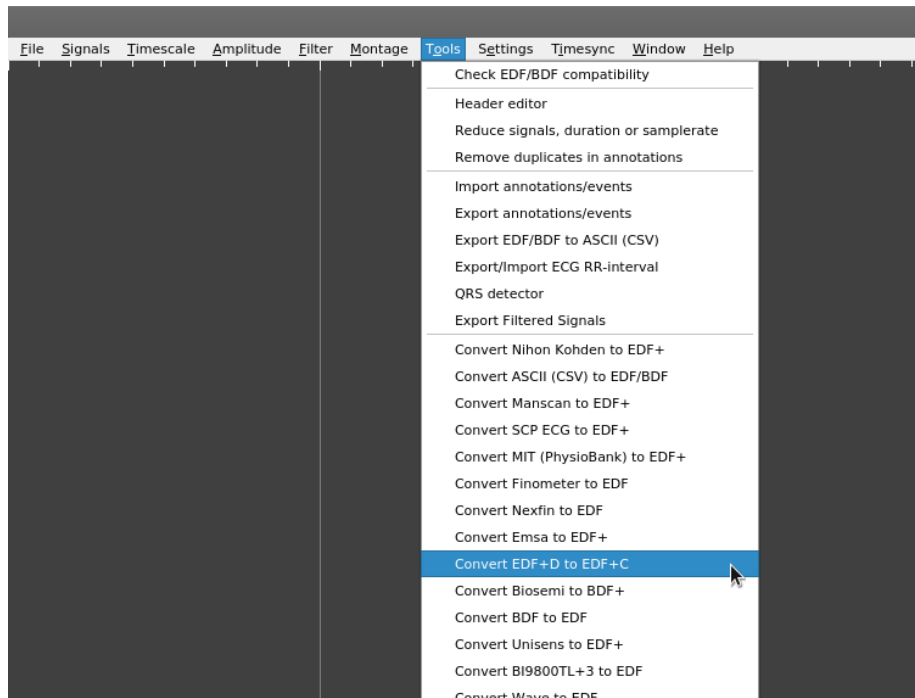
- **Continuous:** to keep the timeline in the file continuous, the data record during the non-recording time can be filled with zeros. This would maintain the timeline within the file.
- **Discontinuous:** ignore the time the recording stopped and "Glue" the different recording sessions together. This creates a jump in the timeline of the EDF+ file.

For most applications, the EDF+ file will need to be in EDF+C format. The majority of softwares and analysis tools require this.

Convert EDF Type

You need to ensure all EDF+ files are in continuous format (EDF+C). This is easy to check within **edf2bids**.

1. Ensure your input directory has been organized prior to opening within **edf2bids**.
2. Within **edf2bids** select the input directory and check the EDF Type column. You should flag any file that is in EDF+D format.
3. Once you have identified the files that are in EDF+D format, open EDFBrowser, select **Tools** at the top and **Convert EDF+D to EDF+C**.



4. A dialog box will open allowing you to select one of the identified files that is in EDF+D format, select one file. 5. Once conversion is complete you will notice the original file remains but now there are several smaller files with a 4 digit suffix accounting for the number of times the recording was stopped/started.

edf2bids Settings

Adjusting metadata settings

You will only need to modify these settings once upon initial installation of the edf2bids software

1. In the **edf2bids** software, select **File** then **Settings**.
2. A settings panel will appear with two tabs: **Json Metadata** and **Electrode Info**.
 - **Json metadata** contains general information about the dataset.
 - **Lab**: what is the name of the lab collecting this data
 - **Experimenter**: list all individuals involved in this dataset
 - **Dataset Name**: overall name for the dataset.
 - **Institution Name/Address**: name and address of the institution at which this dataset was collected
 - **Electrode info** contains information about the specific electrodes used at the center:
 - **Manufacturer**: who produces the electrodes.
 - **Type**: what type of electrode is it (i.e. depth, scalp etc.)
 - **Material**: what material are the electrodes made from (i.e. platinum)
 - **Diameter**: what is the diameter of the electrode
3. Once you have modified the information click **Save** and the information will be stored and used for every subsequent dataset processed by **edf2bids**. You will not need to re-define these values, unless they change at your site.

Main window settings panel

1. The settings panel is located at the bottom left of the main window.
 - **De-identify input directory**: if this is selected the input EDF/EDF+ files will be de-identified first prior to being copied. If left unchecked, then only the output directory EDF/EDF+ files will be de-identified. Default is unchecked.
 - **Offset dates**: if selected all dates in the EDF/EDF+

files will be offset by a random number of days (~1000 days). The offset value can be determined but is securely stored.

- **Test conversion:** this should only be selected if testing the software on new data. This option will not copy the EDF/EDF+ files or read the annotations. This means it will quickly run through the data and output a BIDS structure without the EDF/EDF+ file.

Run Conversion

Input directory selection

The input directory selected here should be organized according to the first section in this documentation. Prior to loading the data, make sure all the settings in the settings panel have been configured to your specification (found at the bottom left of the main window).

1. In the software, select **Input Directory** and choose the directory that contains the data to be converted (select the main/root directory that contains all subject directories). Click **Select Folder** in the window and the data will load into the **Input Directory** window.
2. You will now be able to review the information that was detected about the input files. Each subject is expandable by clicking the box beside the subject name. The columns displayed are:

for a complete list of column explanations see the definitions page

Output directory selection

1. Once you have confirmed the input data is correct, click **Output Directory** and select the directory you want the BIDS dataset to appear. The **Output Directory** window will now present the final output file information (prior to conversion). This is the final check to ensure that any changes have been updated.

EDF/EDF+ files in the Input Directory will be ****COPIED**** to the new location and will be renamed to be BIDS compliant. Thus, you will have two copies of the EDF/EDF+ files. This is a safety measure in case an error occurs in the conversion, the source data will remain intact.

2. If you are converting data for a participant that already has recordings in the output folder, the checkboxes for those recordings will appear checked in the **Output Directory** window.

Convert to BIDs

1. Once you have confirmed the Output Directory file information is correct press the green **Convert** button.
2. During the conversion process you can cancel the conversion at any time by pressing the **Cancel** button. However,

if you cancel the conversion you will need to delete the contents of the output directory and start over.

3. You will receive updates in the **Conversion Status** window. The final notice, once the conversion is complete, will show **Your data has been BIDSified!**.

Convert to SPreD (EpLink)

files will be moved from the BIDS structure to SPreD structure (the BIDS format will be destroyed)

The format required to upload the Brain-CODE is different from BIDS. This conversion step will provide a SPreD compliant format output.

1. Following successful conversion to BIDS, a new button in the main window will become active named **SPreD**.
2. Press the **SPreD** button and wait for the conversion to complete.

Imaging Anonymization

If an **imaging** directory was supplied in the input directory then the blue **imaging** button will be active. Certain DICOM viewers and analysis tools require specific DICOM header tags to be present. Complete removal of these tags may render the DICOMS unreadable by these tools. Instead, the DICOM header tags that are deemed an identifier are overwritten by random data. The tool used to perform this action is dicognito.

??? note "Anonymized DICOM tags" | Attribute | Description
| |-----|-----| | AccessionNumber (0008,0050) | A RIS generated number that identifies the order for the Study. | | FillerOrderNumberImagingServiceRequest (0040,2017) | The order number assigned to the Imaging Service Request by the party filling the order. | | InstitutionName (0008,0080) | Institution where the equipment that produced the Composite Instances is located. | | InstitutionAddress (0008,0081) | Mailing address of the institution where the equipment that produced the Composite Instances is located. | | InstitutionalDepartmentName (0008,1040) | Department in the institution where the equipment that produced the Composite Instances is located. | | OtherPatientNames (0010,1001) | Other names used to identify the Patient. | | PatientID (0010,0020) | Primary

hospital identification number or code for the patient. |
 | PerformedProcedureStepID (0040,0253) | User or equipment
 generated identifier of that part of a Procedure that has
 been carried out within this step. | | PlacerOrderNumber-
 ImagingServiceRequest (0040,2016) | The order number as-
 signed to the Imaging Service Request by the party placing
 the order. | | RequestedProcedureID (0040,1001) | Identi-
 fier that identifies the Requested Procedure in the Imaging
 Service Request. | | ScheduledProcedureStepID (0040,0009)
 | Identifier that identifies the Scheduled Procedure Step.
 | | StationName (0008,1010) | User defined name identify-
 ing the machine that produced the Composite Instances. |
 | StudyID (0020,0010) | User or equipment generated Study
 identifier. |

??? note "Removed DICOM tags" | Attribute/Tag | Description
 | |-----|-----| | CountryOfRes-
 idence (0010,2150) | Country in which patient currently
 resides. | | Occupation (0010,2180) | Occupation of the
 Patient. | | PatientAddress (0010,1040) | Legal address
 of the named patient. | | RegionOfResidence (0010,2152) |
 Region within patient's country of residence. |

1. Following conversion to BIDS/SPReD, press the blue but-
 ton named **Imaging**.
2. Wait for the conversion to complete.

![drawing](img/final_message_imaging.png)

**template: overrides/main.html title: Output di-
 rectory structure**

BIDS directory structure

The output directory will look like the following (each
 subject having their own directory):

- **code:** this folder will contain the code used to con-
 vert the EDF/EDF+ data for each EDF/EDF+ file for the
 subjects.
- **dataset_description.json:** this file will contain the
 Json Metadata you previously defined. This is overall
 information about the dataset
- **participants.tsv:** this file contains a list of all the
 subjects in the dataset and their general demographics
 (i.e. age, sex etc.). This file can also be used

to store additional subject information that is not variable over the different visits and sessions.

Subject directory

directory structure Within each subject directory there will be a different session sub-directory for each day of recording.

- ***_scans.tsv:** this file contains general information about each EDF file for the subject (i.e. filename, recording duration, EDF+ type etc.).

*_scans.tsv content

Session directory

Within each session sub-directory there will be a modality sub-directory (either eeg/ieeg). Within the modality sub-directory there will be five files, containing different information associated with the specific EDF/EDF+ file.

- ***_electrodes.tsv:** contains information associated with the electrodes used to collect the data.
- ***_annotations.tsv:** contains all annotations present in the EDF/EDF+ file, identifiers have been scrubbed.
- ***_channels.tsv:** contains information about each channel that was used in the recording.
- ***_eeg.json/ or *_ieeg.json:** contains metadata information about the EDF/EDF+ file.
- ***_eeg.edf/ or *_ieeg.edf:** contains the data in the de-identified EDF/EDF+ file.

Example

Interactive

SPReD directory structure

1. When the SPReD conversion is completed a new sub-directory will be created in the output directory. All unused BIDS files will be transferred to the **bids_old** sub-directory, while all the SPReD files will be moved to the **SPReD** sub-directory.
2. The **SPReD** sub-directory will look like:
3. Within each sub-directory of the **.zip** folders the same files from the BIDS output will be found:

4. You will be uploading the **.zip** directories to Brain-CODE.

SPReD Upload [EpLink]

Upload data to SPReD

1. Login to SPReD and navigate to the EPL31 project for your site.
2. Create a new subject by pulling down the **New** menu near the top of the screen and selecting **Subject**.
3. This will take you to the new subject page. It is recommended that you enter the participant's age and gender however these are optional. The only required field is the Subject's ID.
4. Press **Submit** at the bottom of the page when done.
5. You are now on the main subject page. From here click **Add Experiment** on the right.
6. On this page, select **EEG Session**.
7. Enter the participant's session name and visit ID, these should be the same as the zip file name. It is also recommended that you enter the date of the recording, but it is not required. In the list of scans, click the scissors icon to delete all but the first row. In the remaining row enter **1** for Scan number and **EEG** for type. You may also optionally add a note about the scan.

[Home](#)[New ▾](#)[Upload ▾](#)[Tools ▾](#)[Help ▾](#)[PROJECT: EpLink Training Project](#) > [SUBJECT: EPL31_TWH_0001](#) >






Add New EEG Session

Project EpLink Training Project

Subject: EPL31_TWH_0001

Session Date Visit ID Scanner ?Acquisition Site

Scans

Scan	Type ?	Quality	Note
 <input type="text"/>	✓ <input type="text"/>	usable ▾	<input type="text"/>
 <input type="text"/>	✓ <input type="text"/>	usable ▾	<input type="text"/>
 <input type="text"/>	✓ <input type="text"/>	usable ▾	<input type="text"/>
 <input type="text"/>	✓ <input type="text"/>	usable ▾	<input type="text"/>
 <input type="text"/>	✓ <input type="text"/>	usable ▾	<input type="text"/>

Home New ▾ Upload ▾ Tools ▾ Help ▾

[PROJECT: EpLink Training Project](#) > [SUBJECT: EPL31_TWH_0001](#) >

Add New EEG Session

Project EpLink Training Project
Subject EPL31_TWH_0001
Session

Date

Visit ID

Scanner ?

Acquisition Site

Scans

Scan	Type ?	Quality	Note
<input type="text" value="1"/>	<input type="text" value="EEG"/>	<input type="text" value="usable"/>	<input type="text"/>

Additional Notes

Notes

8. Press **Submit** at the bottom of the page when done.
9. You are now on the main session page. From here click on **Manage Files** on the right.
10. In the window that pops up, click on **Add Folder**. In

the other window that pops up, for Level select **scans**, for Item select **1** and for Folder enter **EEG**. Once done click **Create**.

11. Now click on **Upload Files**. In the window that pops up select the folder we just created, for Level select **scans**, for Item select **1** and for Folder select **EEG**. Now click on **Browse...** and navigate to the zip file corresponding with the session you wish to upload.
12. Once the file has been selected, click on **Upload**.
13. There will be another box that pops up asking you would like to extract the contents of the archive, click **Cancel**.
14. You are done! If you have more EEG sessions to upload for this participant, you can go back to the main subject page by clicking on the navigation links at the top. You can then repeat from step 5 and on.