



# **WLS Format for NSRTW, NSRTW\_mk2, NSRTW\_mk3 and NSRTW\_mk4**

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## 1 Introduction

This document describes the .w/s binary file format. That format has been designed to be a simplified version of the .wlg format. It contains zero or more records of sound levels, together with additional data, such as temperature, battery level and RSSI.

## 2 Endianness

In all that follows, the endianness is Big-Endian (Network-order).

## 3 Basic Types

The following basic types may be used in this format:

Type Name	Description	Endianness
U8	Single byte unsigned	N/A
U16	16-bit word unsigned	Big-Endian
U32	32-bit word unsigned	Big-Endian
U64	64-bit word unsigned	Big-Endian
I8	Single byte signed	N/A
I16	16-bit word signed	Big-Endian
I32	32-bit word signed	Big-Endian
I64	64-bit word signed	Big-Endian
Sgl	32-bit word in IEEE 754 floating point format	Big-Endian
Dbl	64-bit word in IEEE 754 floating point format	Big-Endian

Table 1

## 4 Complex Types

### 4.1 Arrays

Arrays and strings are prefixed by the number of items in the array *Nb*. *Nb* is in U32 representation. For instance an array *Array[5]* containing the five U16 numbers 1-2-3-4-5 is represented as:

Byte Position	Name	Type	Value
0	Nb	U32	5
4	Array[0]	U16	1
6	Array[1]	U16	2

8	Array[2]	U16	3
10	Array[3]	U16	4
12	Array[4]	U16	5

**Table 2****4.2 Strings**

A string is no different than an array of bytes. So it will be prefixed by *Nb* (an U32). Then will follow *Nb* bytes. There is no string terminator, such as EOT, NULL...etc.

**4.3 Structures**

A structure is simply a concatenation of different types, according to a specified arrangement. There is no padding.

For instance a structure containing the following members is defined to represent the temperature and battery voltage measured at a certain date/time:

Byte Position	Name	Type
0	UTC	U64
8	Temp	Sgl
12	V_Batt	Sgl
16	RSSI	Sgl

**Table 3**

An array of such a structure will contain a number of temperatures and battery voltages that can be plotted as a function of date/time. That array will be organized as follows:

Byte Position	Name	Type
0	Nb	U32
4	UTC[0]	U64
12	Temp[0]	Sgl
16	VBatt[0]	Sgl
20	RSSI[0]	Sgl
24	UTC[1]	U64
32	Temp[1]	Sgl
36	VBatt[1]	Sgl
40	RSSI[1]	Sgl

44	UTC[2]	U64
52	Temp[2]	Sgl
56	VBatt[2]	Sgl
60	RSSI[2]	Sgl

**Table 4**

The scales are according to [Table 5](#)

Signal Type/Contents	Scale
Temperature	$^{\circ}C$
Battery Voltage	$V$
RSSI	$dBm$

**Table 5**

## 5 WLS File Organization

The WLS file is organized as three separate blocks:

- The **Format** block: Contains a structure defining the file type, the instrument type and some instrument-related information. See [Table 6](#).
- The **Instrument Health Data** block: Contains a string of time-stamped battery-voltage, temperature and RSSI, exactly as in [Table 4](#) (Note: RSSI is a new field added in version 2 of the .wls format).
- The **Records** block: Contains 0 or more records (an array of records), organized as described in [Records Block](#).

### 5.1 Format Block

The Format Block is a structure with the following organization:

Name	Type	Description
Format	U32	Represents the file type: <ul style="list-style-type: none"> <li>• 0x574C5301 WLS version 1 for NSRTW/NSRTW_mk2</li> <li>• 0x574C5302 WLS version 2 for NSRTW to NSRTW_mk4</li> <li>• 0x574C5311 WLS version 1 for VSEW_mk2</li> <li>• 0x574C5312 WLS version 2 for VSEW_mk2 and VSEW_mk3</li> </ul>
Model	String	Instrument model

SN	String	Serial Number
FW_Rev	String	Firmware revision
User-ID	String	User-ID
DOB	U64	UTC representing the date of birth
DOC	U64	UTC representing the date of last calibration

**Table 6****5.2 Records Block**

The Records block is an array of zero or more records.

Each record contains the following:

- **Record Metadata:** Contains sampling rate, weighting curve, timestamp... etc.
- **Records Data:** Contains the actual data points for the recorded values (Lmax, LEQ, Lmin and/or Lpk)

**5.2.1 Record Metadata**

Record Metadata is a structure with the following organization:

Name	Type	Description
UTC	U64	Represents the date and time of the start of that record
Interval	Sgl	Represents the log interval (time between two samples). This is typically 1 second, but can be as low as 0.125ms and as large as 2 hours for NSRTW_mk4)
Fs	Sgl	Represents the signal's sampling frequency. Typically 16 kHz, 32 kHz or 48 kHz
Weighting	U8	Weighting curve: 0: dB-C, 1: dB-A, 2: dB-Z
Manifest	U16	Bits 0, 1, 2 and 3 of this word indicate the presence or absence of a value in the record: <ul style="list-style-type: none"> <li>• Bit 0: Lmax</li> <li>• Bit 1: LEQ</li> <li>• Bit 2: Lmin</li> <li>• Bit 3: Lpk</li> </ul>
TZ	I32	Time zone of the instrument. This is indicated in seconds. For instance GMT-6 is -18000.

**Table 7****5.2.2 Record Data**

Record Data is a structure with the following organization:

Name	Type	Description
Lmax	Structure	Data stream containing the Lmax values. <i>That structure is present only if the Lmax bit of the Manifest is 1.</i>
LEQ	Structure	Data stream containing the LEQ values. <i>That structure is present only if the LEQ bit of the Manifest is 1.</i>
Lmin	Structure	Data stream containing the Lmin values. <i>That structure is present only if the Lmin bit of the Manifest is 1.</i>
Lpk	Structure	Data stream containing the Lpk values. <i>That structure is present only if the Lpk bit of the Manifest is 1.</i>

**Table 8**

Each Lxx structure (if present) is organized as follows:

Name	Type	Description
Origin	Dbl	Timestamp of the beginning of that stream. <b>This is close, but NOT the same as the UTC in <a href="#">Table 7</a></b> When the instrument is connected to the cloud service, the timescale of the instrument is finely adjusted using the server time as a reference. This way all instruments connected to the cloud can be synchronized to the server time. That value reflects that fine adjustment.
Scale	Sgl	Time between two successive values. <b>This is close, but NOT the same as the Interval in <a href="#">Table 7</a></b> . When the instrument is connected to the cloud service, the timescale of the instrument is finely adjusted using the server time as a reference. This way all instruments connected to the cloud can be synchronized to the server time. That value reflects that fine adjustment. For instance, in a case where the instrument time is 10ppm behind the server time, and for an instrument that records 4 times per second, that value would be 0.2500025 instead of 0.25.
Data	Array of Sgl	Data stream containing the Lxx values.  <i>Note that it is legitimate to find an empty Data array. That means that the record was started (the timestamp exists), but no data has been recorded. For instance that occurs if the recording was started and stopped before at least one point of data could be recorded.</i>

**Table 9**

The scales are according to [Table 10](#)

Contents	Scale
Lmax	$dB_{SPL}$
LEQ	$dB_{SPL}$

Lmin	$dB_{SPL}$
LPk	$dB_{SPL}$

**Table 10**