go2signals

Description

Format of Recorded Symbol Stream

Document Version 1.3

July 7, 2025

PROCITEC®
HOUSE OF SIGNALS

Imprint

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Document ID:
PROCITEC-DSC-SymbolstreamFormat_E-47ad7e3368

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Contents

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1. Changes

Version	Date	Pages Modified	Author	Change due to
1.0	29.07.2010	all	AS	Initial version
1.1	21.01.2015	all	CSc	Readable appearance
1.3	15.11.2021	all	EH	Version 100 removed Version 200 updated
1.3	04.04.2023	all	AM	Version 300 added info about symbol masks

Table 1: Changes

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2. File format

Demodulated symbols will be stored in a file with extension ".rec". Each file contains single header identifying file type in the following format:

Size [Byte]	Name	Type	Range Min	Range Max	Unit	Description
3	Format identifier	ASCII				Always "REC"
4	Format version	UInt	1	MAXUINT		Format version currently = 300
variable	Metadata	JSON string				terminated with null byte, added in version 300

Table 2: Demodulated Symbols File Format - File Type

The JSON string with the metadata has its own format version and contains several elements. Minor version is increased when new elements are added. A change of the major version means a non-compatible change of the format.

Element	Type	Range Min	Range Max	Unit	Description
format_version	string	1.0	-		Format version currently = 1.0
creation_time	string				timestamp when file/symbolstream was created
rx_frequency	number	(>=0)	MAXINT64	Hz	receiver frequency
demod_type	number	0	MAXINT		demodulator type (optional)
demod_subtype	number	0	MAXINT		demodulator subtype (optional)
symbol_table	array of numbers				symbol table which was applied (optional)
soft_symbol_format	number	0	MAXINT		format for soft symbols (optional)

Table 3: Demodulated Symbols File Format - Metadata

Example:

```
{"format_version":"1.0","creation_time":"2023-04-04T12:11:00.000Z",
 "rx_frequency":123.0,"demod_type":5,"symbol_table":[1,0]}
```

This file header is followed by data blocks. Each data block consists of a block header, followed by symbol and quality data.

Block header format:

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Size [Byte]	Name	Type	Range Min	Range Max	Unit	Description
4	Symbol count	Int	0	MAXINT		Number of symbols for one channel in a packet
4	Channel count	Int	1	100		Number of channels
4	Bits per symbol	Int	1	16		Bits per symbol
8	Symbol rate	Double	> 0	MAXDOUBLE	Symbols/sec (Bd)	Symbol rate
8	Timestamp seconds	Int64			sec	Seconds since 1.1.1970 00:00:00 UTC for first symbol
8	Timestamp fraction	double	$>= 0$	< 1	sec	Additional fraction

Table 4: Demodulated Symbols File Format - Data block header

This header is followed by a sequence of symbols, where each symbol is stored as one integer (4-byte) value. If there are multiple channels, symbol values are are sorted in channel blocks (i.e. not interleaved) and total number of symbols (per block) can be calculated as <Channel count> * <Symbol count>.

Size [Byte]	Name	Type	Range Min	Range Max	Unit	Description
4	Symbol 0 (Channel0)	Symbol format	0	MAXINT		Symbol value (Only Bits/symbol bits will be used)
4	Symbol 1 (Channel0)	Symbol format	0	MAXINT		Symbol value (Only Bits/symbol bits will be used)
...						
4	Symbol 0 (Channel1)	Symbol format	0	MAXINT		Symbol value (Only Bits/symbol bits will be used)
4	Symbol 1 (Channel1)	Symbol format	0	MAXINT		Symbol value (Only Bits/symbol bits will be used)
...						

Table 5: Demodulated Symbols File Format - Symbols

Symbol Format: 00EB SSSS SSSS SSSS SSSS SSSS SSSS SSSS
S = Symbol Bits (1 . . . 28, MSB first)
B = 1: → First Symbol of Burst
E = 1: → Last Symbol of Burst

The symbols might contain special marks:
BURST_START_MASK = 0x10000000
BURST_ENDE_MASK = 0x20000000
To a symbol at the beginning of a burst (only first channel) the BURST_START_MASK is added (logical or) and to the very last symbol of a burst (in last channel) the BURST_ENDE_MASK is added (logical or). To get the actual symbol value

```
val = symbol & (~( BURST_START_MASK | BURST_ENDE_MASK )
```

INVALID_SYMBOL_MASK (= 0x08000000) marks symbol as invalid and is used for filling unused time slices or nonexistent channels.

Symbol data is followed by sequence of quality values for each symbol. Relative position of the quality value in quality block is the same as relative position of the corresponding symbol in the symbol block.

Size [Byte]	Name	Type	Range Min	Range Max	Unit	Description
4	Quality for symbol 0 (Channel0)	Quality Format	0	100	%	Least significant 8 bit for quality of symbol
4	Quality for symbol 1 (Channel0)	Quality Format	0	100	%	Least significant 8 bit for quality of symbol
...						
4	Quality for symbol 0 (Channel1)	Quality Format	0	100	%	Least significant 8 bit for quality of symbol
4	Quality for symbol 1 (Channel1)	Quality Format	0	100	%	Least significant 8 bit for quality of symbol
...						

Table 6: Demodulated Symbols File Format - Quality Values

Quality Format:
Least significant 8 bit →Symbol Quality (hard decision)
0 = bad, 100 = excellent
Most significant 24 bit →Soft decision symbols
These are optional and the type depends on the demodulator (format defined by decoder), e.g. PSK: 12 bit for phase and 12 bit for absolute value.

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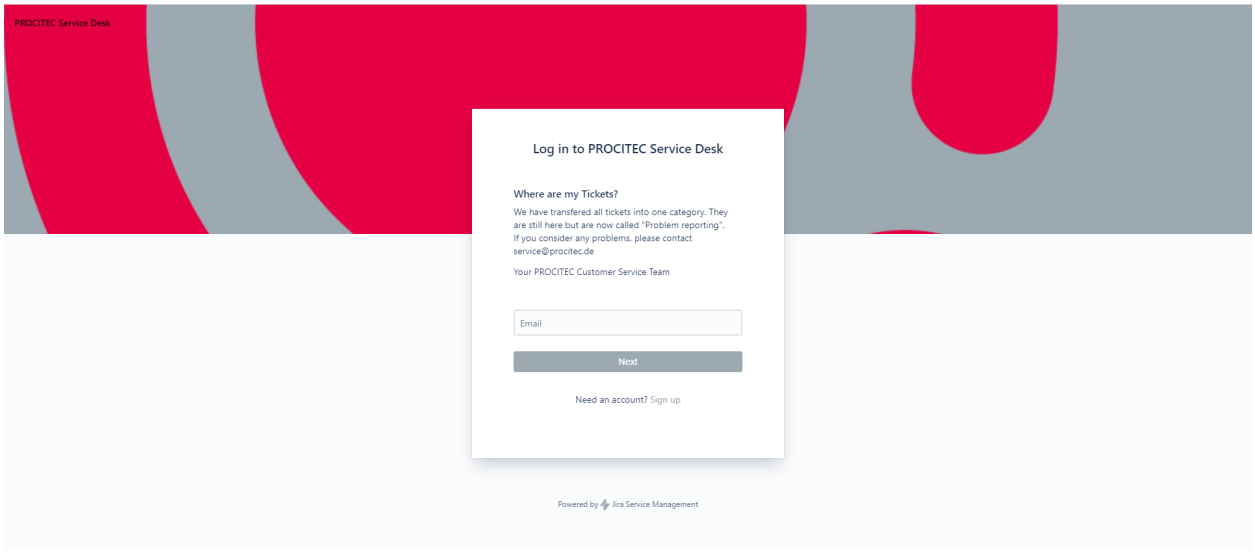
A. Support

Requests and suggestions?

All requests or suggestions regarding our go2signals product-range are very much appreciated; we would be delighted to hear from you.

Any questions? We are happy to assist you!

If you have any further questions, please do not hesitate to contact our Support Team for rapid assistance – just raise a service request at: **http://servicedesk.procitec.com**.



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