

# Software 35.28

## Release Notes

### Platform

We now support **Debian 11 (Bullseye)**

### API

#### **Windows PIP/Wheel Package for Python 3.7**

This package would not run standalone (it required 4 Links API to be installed as well)

#### **Windows Python 3.9**

We now support Windows 3.9 as part of the API and a PIP/Wheel package

### Documentation

Updated **python.pdf** with information about Windows Python Support. If the version of python being used is not on our supported list, end users are requested to contact [support@4links.co.uk](mailto:support@4links.co.uk) in order for us to build support for the requested version of python

# Software 35.26

## Release Notes

### Documentation

#### Device Update

**updates.pdf** how to update the firmware for units

#### Error Injection

**ErrorInjection.pdf** error injection documentation and examples  
**transport\_credit** example program controlling transport credit

### API

#### C

`EtherSpaceLink_set_speed_delay`, the function **EtherSpaceLink\_set\_speed** can take a while to transition from the one speed to another (for example 10Mbps to 200Mbps) as the PLL is transitioned to the correct speed. It is possible for your application to run at incorrect speeds. In order to alleviate this issue, we now introduce a delay. You can use **EtherSpaceLink\_set\_speed\_delay** to extend or remove the delay.

#### C++/Python

**speed\_delay** binding to **EtherSpaceLink\_set\_speed\_delay**

### Applications

#### spw\_msrr

`spw_msrr` is a native version of the **java read** program. It provides the same functionality as the java program without having to install a Java Runtime.

We have added two options to this program for managing the timestamp display of the unit (currently the time displayed is the time in nanoseconds since unit powered on)

**-epochtime** displays the time as a nanosecond / epoch combination

**-humantime** displays the time in a conventional date format

We now ship the dissectors for RMAP on Windows platforms.



# Software 35.24

## Release Notes

### Documentation

#### End User License Agreement

We now provide a formal End User License Agreement

### Programs

#### **spw\_echo**

This program is used to echo data between ports. It has been updated to

- 1.Support proxying of data between more than two ports
- 2.Allow filtering of data using a LUA plugin (see plugins\lua\spwecho/frame\_filter.lua )

#### **spw\_ioio spw\_msrr**

These replacements for the java READ and SPWIO java programs now correctly run on windows

#### **spw\_read spw\_io**

Windows wrappers for the java READ and SPWIO java and spw\_ioio, spw\_msrr programs. If installed the java programs are called. If java is not installed the compatible spw\_msrr and spw\_ioio programs are called.

# Software 35.22

## Release Notes

### **Installation**

#### **Debian Stretch**

We support Debian Stretch. Packages are supplied in deb format.

#### **Debian Buster**

We support Debian Buster. Packages are supplied in deb format.

#### **Ubuntu**

Packages are now supplied in deb format, and the use of alien is no longer required.

#### **Alma Linux 8**

With the change of emphasis of future CentOS builds, various new distributions are coming to the market in order to fulfill the same role. The first of these is Alma Linux.

Packages are in the standard RPM format.

## Utilities

### spw\_msrr

A new program which is identical in command syntax to the Java Read program. This provides read functionality without having to install a Java runtime. Custom dissectors can be written without recourse to java or C++ using the **Lua** programming language. See the document **dissectors.pdf**.

Note that this program is not available on CentOS 5 or CentOS 6.

### spw\_ioio

A new program which is identical in command syntax to the Java SpwIO program. This provides spwio functionality without having to install a Java runtime. Custom dissectors and encoders can be written without recourse to java or C++ using the **Lua** programming language.

See the document **dissectors.pdf** for information on writing dissector and **encoders.pdf** for writing an encoder.

Note that this program is not available on CentOS 5 or CentOS 6.

### READ.jar

This program used to give extreme ( $10^9$  megabytes per second) estimated link speeds when decoding packets. This has been resolved.

The RMAP dissector has been updated to include better information to handle read modify writes better.

We now show auto increment as **AI** rather than "..."

### 3ucodes

This program displays diagnostic information for error codes on the 3U units. If you don't supply a code, it displays information about all codes, if given a specific code to displays information about that code.

### 3usetup

This program allows users to quickly configure their 3U devices.

### spw\_io

This is a wrapper to call the Java Program spwio.jar , if the java app is not installed it will call the **spw\_ioio** program.

### spw\_msr

This is a wrapper to call the Java Program read.jar , if the java app is not installed it will call the **spw\_msr** program.



## API

### C++/Python Virtual Callbacks

All virtual callbacks are now private virtual functions allowing callbacks to be **only** called when the event occurs. This primarily is meant to resolve issues associated with calling virtual functions from python resulting in application locking up due to **GIL** issues.

### Fuzzing Support

**pre\_flush** application callback added to aid fuzz testing, see the document **fuzz.pdf** in the documents section.

### C++/C/Python Protocol Decoders

We provide API access to the decoder library for C/C++ and python programs. This allows users to embed 4links and custom dissectors in their applications. The C binding may be used to access the decoder library from LabView as well.

Python examples are **msr\_decode\_file** and **msr\_decode\_buffer**

C/C++ examples are **proto\_decode\_buffer.c** and **proto\_decode\_file.c**

### C++/Python

**set\_close\_on\_exec** (Linux/MacOS) if you wish to use fork in your application you may need to set this flag in order to ensure correct network operation.

# Software 35.20

## Release Notes

### API

#### C/C++/Python

The address of the 4Links unit can have a bind device / address specified, such that the connection is bound to that device / ip address prior to the connection being made. This is achieved by appending @<devicename> or @ipaddress to the connection string, for example dsi@eth0 or [dsi@10.10.10.1](#). Port number overrides must be present before this string , for example dsi:4949@eth0.

Binding to a device is not present on windows, and may require privilege on certain platforms.

#### RMAP

When performing an RMAP write of zero bytes an additional 0x00 EOP sequence was sent this has been resolved

The RMAP API documentation has been updated to include references to the examples

#### C

It is now possible to initiate MSR captures from C, since these functions are exported in our DLL it is now very easy to capture from such tools as LabView. See **eslcapture.h**

### Utilities

#### rmap\_server

In order facilitate testing of RMAP initiators who wish to have a memory read/write interface we have shipped rmap\_server. It's usage is **rmap\_server <dsi> port** where dsi is the ip address of your DSI and port is the port number we attach to. There will then be an RMAP memory target running on the DSI.

Simply connect your initiator to a spacewire port on your DSI and you should be able to test it.



# Software 35.18

## Release Notes

### API

#### **RMAP**

Server performance improvement, previously RMAP API only read from 8 byte chunks, now uses large network buffer.

0 byte transfers, rmap reads,writes, and readmodifywrites with 0 sized buffers would fail.

Improved memory usage, rmap does not allocate buffers for handling rmap responses instead uses the rmap transaction parameter as a context.

Transaction Identifier, introduced API verbs for controlling the scope of the transaction identifier (previously on a per dsi basis), now can be on a per port basis, per dsi basis, and global basis.

Allowed user callback class to assign transaction identifiers

# Software 35.16

## Release Notes

### API

#### C

Introduced **EtherSpaceLink\_hold\_data** as a means of holding data until either J1/J2 transition to high.

C++ / Python/ Java

**hold\_data** as a means of holding data until either J1/J2 transition

C++ / Python RMAP

clientside/serverside API available see **rmap\_api.pdf**

A set of examples for C++ and python

C++ application programming simplified

C++ callback now passed target logical address rather than return address logical address

Sometimes RMAP Read calls returned with previous data due to locking issue

MSR API

Improved example for msr python binding

Now accepts JSON capture configuration

Java API

Java API now reports errors by exception rather than return code

### Documentation

#### User Guides

Some of the user guides had an incorrect pinout with respect to the spacewire D type connector

#### Python

Updated documentation on the python capture interface classes **msr\_capture** and **pcap\_capture**

.

### Utilites

#### Virtual DSI

On Windows platforms the return value from the accept call was not checked correctly.

## **Web Interface**

We provide a **msrw** an application which provide a web based JSON service allowing JSON requests to control the acquisition of data from an msr. This is documented in **web\_msr.pdf**.

## **Java Wrappers (Linux and MAC)**

These wrapper classes did not handle quoted parameters correctly. This has been resolved.

# Software 35.14

## Release Notes

### API

#### **Non Blocking Calls**

When non-blocking calls are made without erroring out it is not possible to differentiate between timeout calls and calls interrupted by meta data callbacks as both cases have PART\_EOP\_EEP set as the packet type. That is a return value of 0 and metadata type set to PART\_EOP\_EEP.

This has been changed such that in the event of a timeout the metadata is now set to TIMEOUT.

# Software 35.12

## Release Notes

### API

#### C

We now provide **libetherspacelink\_static.a** on Linux/Mac and **etherspacelink\_static.lib** on Windows, for those developers who wish to have a runtime embedded into their applications without recourse to an external runtime.

#### Python

We now support python 3 on **CentOS 7** and **CentOS 8**

We now supply a PIP (whl) package which can be used to install the python module without recourse to install the complete package. We currently do not support source whl distributions.

### Utilities

**vdsi** Introduced a virtual **DSI** utility allowing application developers to code against our API without having physical access to our hardware. This may be useful for software test and integration. Please see the documentation in **docs/V-DSI**

### Wireshark

Wireshark.pdf has been updated with the complete list of packet codes

# Software 35.08

## Release Notes

### API

#### C++

**nolinks** function now returns unsigned as can't have a device with negative links and errors are thrown.

**active\_port** now accepts an unsigned port number as port numbers can't be negative.

#### Java

The supplied jar file etherlinks.jar was built using an unnamed package which may be problematic for developers. The jar file now packages in **com.\_4links.spacewire**.

In order to change your java accordingly you need to add **import com.\_4links.spacewire.\*;** to your java.

### Utilities

#### spw

The program breaks down packets into chunks for transmission. When only transmitting on a single link it no longer does this.

The spw program now prints out the chunk size it is using, and if no chunking is taking place indicates this too.

### Documentation

#### graphical\_msr.pdf

Updated documentation with a section on how to use our software in conjunction with gtkwave.

# Software 35.06

## Release Notes

### API

#### C++

We have reduced the size of the `esl::connection` class such that it is easier to instantiate said objects on the stack. Previously objects of this type held on the stack (especially in Windows) would lead to program aborts.

## Software 35.04

### Release Notes

#### API

##### python

We have introduced the **msr\_capture** and **pcap\_capture** classes for application developers who wish to control an msr during their runs. The **msr\_capture** captures in the 4links native format and **pcap\_capture** captures in a pcap form.

The constructor takes 4 parameters

- The hostname / ip address of the msr
- The target file / directory
- The capture configuration file (as generated by the GUI program)
- File Size, if you want the capture to split the data into multiple files please specify the file size that you want the capture to be split into, this size is in MB. If you don't want file splitting then specify 0

We have supplied the python examples **msr** and **msr\_cap**.

## **Python API Performance**

We have updated the python API guide discussing implications of python's threading model.

The python interpreter has some known issues with respect to threading, whilst python uses system threads to implement threading, the actual interpreter can only run in one thread at a time, if other threads are not waiting on I/O they will be waiting for the python interpreter to be assigned to that thread.

Essentially python code in python threads is run co-operatively.

A more elegant way of putting this, is that currently you will never get more than a single core's worth of python code running at any instant.

If you need to have more than a single core's worth of code running, then your application must be process based as opposed to thread based.

## **Java Read Application**

This program displayed false EOP's at the end of packet captures. This has now been resolved.

# Software 35.00

## Release Notes

### API

#### C

**EtherSpaceLink\_open** does not check the result code of the asynchronous connect call correctly and will try and negotiate on a connection which is not connected resulting in a somewhat incorrect error code being returned. You will still get an error, but with this correction or more applicable error.

#### C

Introduction of **EtherSpaceLink\_request\_link\_status\_port** which requests port status without switching active link on DSI/MSR and 3U devices. On ESL devices it will switch the active port.

#### C++/ python

**request\_link\_status\_port** method added which performs the same as the function above for the connection class

The timetag callbacks on Windows would report incorrect wall times thus producing incorrect pcap packet timestamps.

### msr

Corrected usage of the /f parameter so as not to error.

The msr program has the ability to break large captures into smaller configurable chunks. Currently they are incrementally numbered, the file name is now the start and end times of the capture. If you want the chunks to be incrementally file numbered set the environment variable **ESL\_FILE\_INDEX**

#### PCAP capture

The offset from UTC in the PCAP header is now populated ensuring consistent timing when reading pcap files in different timezones..

## Software 34.98

### Release Notes

#### **New Linux Platform**

We now support **Ubuntu 20.04** with this release comes for support for both python 2.7 and python 3.

The default is for python 2.7 (as this is the install default) but if you wish to use python 3 then set the environment variable **ESL\_PYTHON\_VER** to **3**

## Software 34.96

### Release Notes

#### **msr capture program**

The msr capture program allows users to capture traffic on specific ports, currently it captures traffic on all ports irrespective of this parameter. This has now been rectified.

# Software 34.94

## Release Notes

### **spwio Documentation**

The PDF for spwio was incorrectly printed in landscape as opposed to portrait.

### **esl\_srscfg**

We have introduced the **esl\_srscfg** utility in order to make configuring SRS routers simpler.

### **esl\_spw**

We have introduced **esl\_rspw** a utility which allows one to send and receive RMAP/CCSDS and raw messages without resort to complex programming.

### **spwio RMAP plugin**

This plugin displayed “...” when either more than 8 bytes of data were received or if the increment address flag was set, this caused a degree of confusion. Instead, if the increment address flag is set the plugin displays the token “AI”

# Software 34.87

## Release Notes

### **MSR Capture**

When requested to capture NULLS (ESC-FCT) the msr capture program generates the appropriate records whilst recording to PCAP formatted files.

### **Java Read Program**

The Java read program now displays NULLS (ESC FCT) when encountered.

### **Wireshark Plugin**

The wireshark plugins now display ESC FCT (NULL) and FCT frame data.

### **Spw program**

We now allow a spin up period in the average throughput calculations

### **SRS Configuration**

We have improved error reporting when configuring SRS routers.

## Software 34.86

### Release Notes

#### **CentOS-8**

We now provide support for CentOS-8

#### **Apple Mac 19.0.0**

We now provide support for MacOS Catalina (19.0.0)

#### **API Change**

##### **EtherSpaceLink\_dump\_status**

This function provides a means of dumping given context to stderr for help in debugging applications.

# Software 34.83

## Release Notes

### **Wireshark / PCAP Integration**

When using packet aggregation with the final EOP being preserved (ESL\_PCAP\_RECORD\_EOP\_TS) we didn't preserve the final EOP if short timestamps were sent by the msr. This is now rectified.

### **API Change**

The EthersSpaceLink\_close, EthersSpaceLink\_shutdown, EthersSpaceLink\_abort calls now shutdown the spacewire ports automatically, user applications no longer have to.

### **Documentation**

The documentation for the 3U was missing, this is now included in the doc package.

Software 34.82

Release Notes

**Graphical Capture program**

When running capture recording to multiple files, the file size limit is now respected.

# Software 34.81

## Release Notes

### **Version Number change**

We have now added patch release numbers to the version identification.

The version numbering is now of the format

<ReleaseNumber>.<VersionNumber><PatchLevel>

The first patch to this version will be known as 34.82.

### **C++ RMAP**

The C++ API for RMAP has been corrected with respect to the endianness of the command byte, previously the bit positions of command flags were reversed causing corrupt RMAP messages.

### **READ program**

The java read program did not load the RMAP plugin correctly.

### **RMAP plugin**

Support for Read Modify Write verb has been added

### **MSR capture program**

The msr capture program places waveforms in the current directory if the environment variable ESL\_WF\_DIR is not set. ESL\_WF\_DIR is an environment variable that controls where waveform files are saved.

### **Waveform files**

When a waveform file is saved by the msr program, the name of the file is printed to stdout and the waveform file is prefixed with the epoch time. Allowing easy identification of the capture file in any logs.

### **SVG Waveform files**

These are now scaled correctly, so there are no longer have large blocks of unreadable color.

### **Python 3.7 Support on Windows**

Support for Python 3.7 on windows. If python 3.7 is required, set ESL\_PYTHON\_VER to 3.7 prior to running 4linksvars.

### **Python timecode example**

examples/python/timecode is an example of how to send and listen for Spacewire timecodes.

### **Graphical Capture program on Windows**

The graphical capture program uses GTK, however the GTK runtime ships with a DLL used by other packages and this can stop the program starting. The environment program 4linksvars.bat puts the GTK libraries in the path before other libraries.

### **Change of License for example programs**

All examples are now shipped with the BSD license making copying and reuse of the examples easier.

### **Graphical Capture program / Wireshark Integration**

It is now possible to capture directly into Wireshark from within the graphical capture program

### **Improved PCAP buffering**

The PCAP file buffer has been made an optimal size.

## API Changes

### Return Values

Throughout a return value of `-1` was used to indicate an error, this has been changed. If a function returns a value `< 0` an error has occurred, the returned value being the error code as described in `EtherSpaceLink_Constants.h`. This change does not affect the C++ or Python bindings as error handling is now by exception.

### `EtherSpaceLink_read_packet_full`

When called with `EtherSpaceLink_REPORT_SPECIAL_DATA` and `EtherSpaceLink_REPORT_EXTENSION_DATA` this function used to return `-2 - <number of bytes>`. This conflicts with the error handling as defined above. Instead the returned flags indicate whether a size is being returned. If the returned flags are `EtherSpaceLink_SPECIAL_SIZE` or `EtherSpaceLink_EXTENSION_SIZE` then the returned value is the number of special or extension bytes.

Example:

```
unsigned char rxbuf[4096];
int bytes_received, extension, ii;
int flags;
int active_port;

EtherSpaceLink esldev = EtherSpaceLink_open("1.1.1.1:1234");
if (!esldev)
{
    printf("Unable to connect\n");
    return 1;
}

bytes_received = EtherSpaceLink_read_packet_full ( esldev,
                                                rxbuf,
                                                sizeof(rxbuf),
                                                &flags,
                                                EtherSpaceLink_REPORT_EXTENSION_DATA
                                                | EtherSpaceLink_REPORT_SPECIAL_DATA
                                                );

if (bytes_received < 0)
{
    // Error condition
    fprintf (stderr, "Error %d \n", bytes_received);
    return 1;
}
switch (flags)
{
    case EtherSpaceLink_SPECIAL_SIZE:
    case EtherSpaceLink_EXTENSION_SIZE:
        fprintf (stdout, "%d bytes of special data\n", bytes_received);
}
}
```

## **receivePacket (java)**

This function no longer reports the size of extension or special data as a negative number. Instead one must check the context of the return value by calling **get\_terminator**. If this function returns **SPECIAL\_SIZE** or **EXTENSION\_SIZE** then the size returned is the extension size. Note that if **enable\_callbacks** is called the application developer does not have to perform analysis of special and extension\_data, and instead you get high level callbacks (e.g. link changed, error, or waveform data);

## **EtherspaceLink\_fastclose**

Introduced new API verb which shuts down the connection as soon as possible using SO\_LINGER with a timeout of 0.

Language Implementations

C++ method fastclose

Java method fastclose

Python method fastclose

## **EtherspaceLink\_sendtimecode**

Explicit function to send a Spacewire timecode.

Language Implementations

C++ method send\_timecode(timecode)

Java method send\_timecode(timecode)

Python method send\_timecode(timecode)

## **EtherspaceLink\_get\_error**

This returns the last error to occur in the **current thread** in the EtherSpaceLink library, mostly it should not be required to call this as functions return the error code directly. This change ensures that error codes are thread safe between receiver and transmit threads.

## **EtherspaceLink\_get\_error\_text**

This returns a string description of the error last error to occur in the **current thread**.

This change ensures that error codes are thread safe between receiver and transmit threads.

