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## 1. General

The link program SOFTNET-TF/APRED allows attachment to the fault-tolerant SINEC H1 bus. The task of the redundancy software is to maintain data exchange between the controller and partner system if a fault occurs on the communications system by using standby components. To detect problems, SOFTNET-TF/APRED has synchronization functions.

Computers on the fault-tolerant SINEC H1 bus communicate with each other using the AP protocol that was expanded to include redundancy functionality. The tasks relating to redundancy are handled separately by SOFTNET-TF/APRED. The application has only the functionality of *transparent data exchange* of the function class *serial transfer* available.

User jobs are assigned a unique job number by SOFTNET-TF/APRED. This allows duplicated jobs, old jobs and job losses to be detected and handled.

When no problem has occurred, communication is via a master connection (one of two technique). This can be configured per fault-tolerant connection. SOFTNET-TF/APRED is ready to receive on both connections.

SOFTNET-TF/APRED has the following functions necessary for redundant operation:

- Watchdog monitoring of user jobs
- Repetitions of user jobs
- Master/standby routing
- Switchover algorithms
- Monitoring of the communications system
- Synchronization of fault-tolerant connections
- AP protocol handling
- Supply of status displays

## **2. Software**

### **2.1. Structure of SOFTNET TF/APRED**

SOFTNET-TF/APRED is an extension of SOFTNET-TF providing redundancy functions. Hidden from the application, an application association is mapped on two AP connections.

As with SOFTNET-TF/UNIX, the programming interface is the TF interface representing the interface to the *technological functions* regardless of whether redundant or non-redundant communication is used.

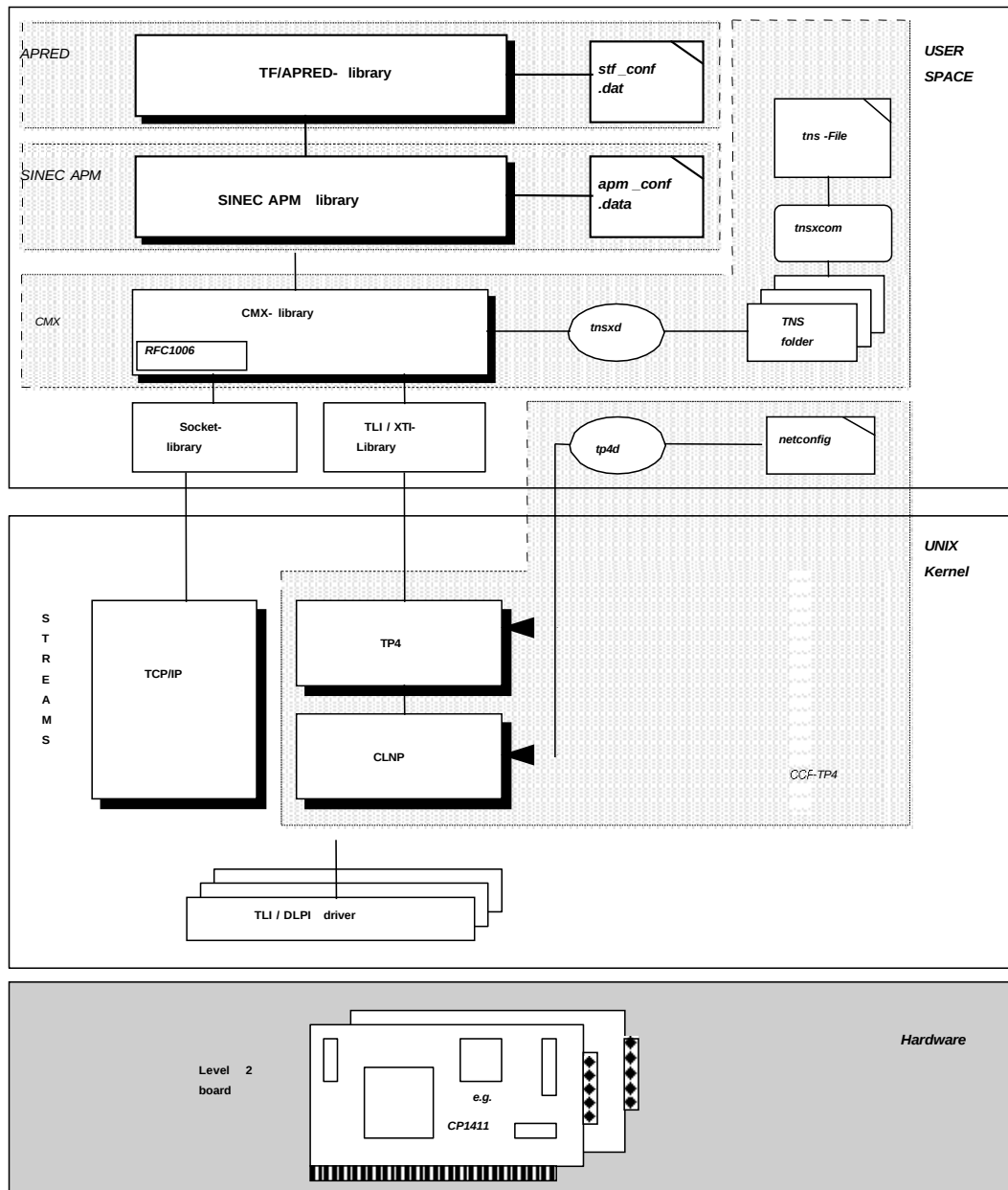


Figure: Overview of SOFTNET TF/APRED

## 2.2. Architecture of SOFTNET-TF/APRED

SOFTNET-TF/APRED is supplied as an *add-on* to SOFTNET-TF. It can only be operated when SOFTNET-TF is installed. This consists of a total of four software components described in detail in the relevant documentation. Below, there is a brief overview of the individual components:

|             |                                                                                              |
|-------------|----------------------------------------------------------------------------------------------|
| SINEC-TF/AP | SINEC technological functions with syntax corresponding to SINEC AP                          |
| SINEC-APM   | AP monitor (protocol handler)                                                                |
| CMX         | Communication Manager UNIX,<br>Access to communication Layer 4, addressing via logical names |
| CCP-TP4     | Transport provider with connectionless network                                               |

SOFTNET-TF/APRED provides the redundancy functions by replacing SINEC-TF/AP with SINEC-TF/APRED.

|                |                                                                                                                                                          |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| SINEC-TF/APRED | SINEC technological functions with syntax corresponding to SINEC AP<br>extended by the APRED functionality for the non-open service<br>"serial transfer" |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

## 2.2.1. Components of "SOFTNET-TF/APRED"

### 2.2.1.1. Function of the Components

SOFTNET-TF/APRED provides the redundant SINEC automation protocol for the service group for transparent data exchange as a library. All the functions necessary for redundant operation are covered by the redundancy software, the functions are not visible to the user so that both redundant and non-redundant applications can be handled at the same time with the product. The user data are transferred transparently and the structure and content of the data must be negotiated between the partners. For redundancy, the complete functionality of the *"Transparent Data Exchange"* function of the function class *"Serial Transfer"* of SINEC-TF/AP is supported. The service required are as follows:

| Transparent data exchange |                                                             |
|---------------------------|-------------------------------------------------------------|
| Function                  | Description                                                 |
| req_msg_exch              | Transfer data (initiator client application)                |
| rsp_msg_exch              | Send positive acknowledgment (initiator server application) |
| rsp_msg_neg               | Send negative acknowledgment (initiator server application) |

### 2.2.1.2. Installed components

Apart from the libraries and header files, test programs and sample programs are installed in the form of source code.

|                                                                                                                                                         | Functionality                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /usr/lib/apred/libapred.a<br>/usr/lib/apred/libapred.so                                                                                                 | SINEC TF/APRED library incl. TF/AP convertor<br>Static and dynamic library, can be used as required                                                                                                                                                                                     |
| /usr/include/apred/stf_new.h<br>/usr/include/apred/stf.h<br>/usr/include/apred/stf1.h<br>/usr/include/apred/stf_func.h<br>/usr/include/apred/stf_prty.h | Definition of the STF interface Part 1 and Part 2 (new applications)<br>Definition of the STF interface Part 1 (old applications)<br>Definition of the STF interface Part 2 (old applications)<br>Definition of the function selection<br>External declaration of the TF function calls |
| /usr/scp/redtools/apredping<br>/usr/scp/redtools/conf2tns                                                                                               | Test program, checking redundant application associations<br>Converter, to convert the redundant application associations defined in stf_conf.dat into TNS entries                                                                                                                      |
| /usr/src/apred/apred_ping.c<br>/usr/src/apred/apred_error.c<br>/usr/src/apred/Makefile                                                                  | Sample program: Source code, Part 1, for the test program <i>"apredping"</i><br>Sample program: Source code, Part 2, for the test program <i>"apredping"</i><br>Sample program: Makefile for the source code, generates the test program <i>"apredping"</i>                             |
| /usr/example/apred/stf_conf.dat<br>/usr/example/apred/apmconf.data                                                                                      | Example: An STF configuration file <i>"stf_conf.dat"</i><br>Example: An APM configuration file <i>"apmconf.data"</i>                                                                                                                                                                    |

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