PJ46952 – Support conversion between STCKE and time_t

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Systems Control Program

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Problem Statement

When the STCK or STCKF instruction is used to get the TOD clock, an 8-byte (64-bit) TOD clock value is returned.

- The time origin is January 1, 1900 at 00:00:00 UTC.
- The 8-byte TOD clock value will wrap on September 17, 2042 at 23:59:57 TAI.

When the TOD clock is used to calculate a date 20 years in the future, the wrap in 2042 is causing errors in the calculation.

Pain Points

Handling of C typedef time_t in 2042 and beyond.

- Typically, the time and date is saved in time_t rather than in a TOD clock format.
- TPF function tpf_STCK_to_timet() is used to convert an 8-byte TOD clock value into a time_t value.
- When the 8-byte TOD rolls over in 2042, the return from tpf_STCK_to_time() will be a negative number that represents a time in the year 1900.

Pain Points (continued)

Handling of a STCKE TOD clock value.

- STCKE provides a 16-byte TOD clock value.
  - 8-bit epoch
  - 104-bit TOD clock value
  - 16-bit TOD programmable register
- No issue with roll over in 2042 or in any of our lifetimes.
- There is no function to convert a 16-byte TOD clock value into a time_t value

As-Is User Story

A STCK that gets an 8-byte TOD clock value is used and the result is converted into a time_t value.

```
#include  <tpf/c_stck.h>
#include  <tpf/tpfapi.h>

   tpf_TOD_type   curTODtime;
   time_t         curTime;

   tpf_STCK(&curTODtime);
   curTime = tpf_STCK_to_timet(curTODtime);
```

To-Be User Story

A STCKE that gets a 16-byte TOD clock value is used and the result is converted into a time_t value.

```
#include  <tpf/c_stcke.h>

   tpf_TOD_ext_type  curExtTODtime;
   time_t            curTime;

   tpf_STCKE(&curExtTODtime);
   tpf_STCKE_to_timet(&curExtTODtime, &curTime);
```

Technical Details

New API to convert STCKE value into a time_t value

```
int tpf_STCKE_to_timet(tpf_TOD_ext_type* tod_in, time_t* t_out)
```

Technical Details

New API to time_t value into a STCKE value

```
int tpf_timet_to_STCKE(time_t t_in, tpf_TOD_ext_type* tod_out)
```

Value Statement

Ability to create time_t values that are beyond September 17, 2042.

Conclusion

APAR PJ46952 provides this support. It is available. It was shipped in January 2023.

Thank you