Time Definitions

- **There are 6 different times stored in the database**
- **header_tab**
  - **sc_recv_time – the time the spacecraft received the data packet from the CEB. This is the primary key for most tables in the database since it is guaranteed to be increasing. It is in 256th of seconds.**
  - **sc_ev_time – the spacecraft time at the middle of the collection period in 256th of a second. This is computed using the ceb-time at the beginning of the collection period plus the delta between ceb_time and spacecraft time from the last CEB/SC time synch.**
  - **UTC – the sc_ev_time expressed in a standard time format.**
  - **ceb_time – the CEB time at the beginning of the collection period. This has been adjusted for the possibility of the rollover counter having rolled over.**
  - **earth_recv_time – the time the data was receive on earth. This is days and milliseconds since 1970**
- **grs_spectrum_tab**
  - **sc_recv_time – the time the gamma packet was received by the spacecraft in 256th of a second. (This is equal to gam_sctime in the header_tab)**

CEB Rollover Time

- **CEB clock is a millisecond timer that rolls over every 65536 milliseconds**
- **There is a 32 bit rollover counter kept in software**
- **The lower 16 bits of this rollover are placed in every data packet sent out of the CEB.**
- **Within the database we keep track of the upper portion of this rollover counter. We know when the CEB was turned on and we know how long it will take for 2^16 milliseconds to go by.**
- **When we calculate a CEB time we take the upper portion of the rollover and add it back into the time.**

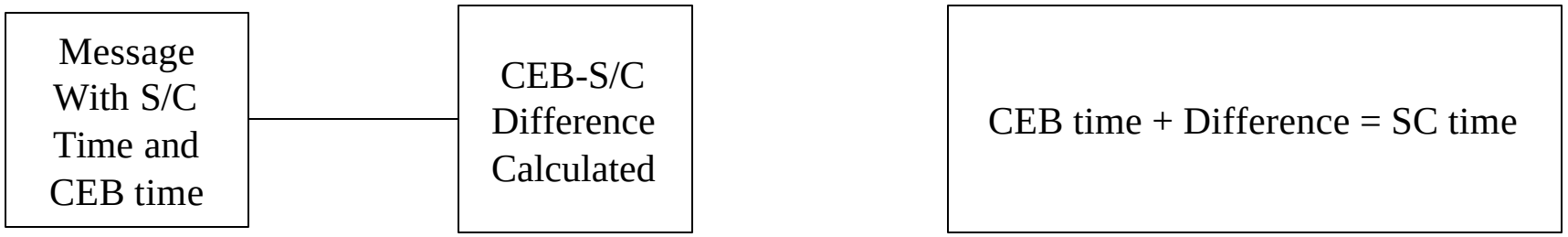
CEB Time Synchronization Calculations

CEB to S/C Conversion

1. A time synch message is received from the CEB with both CEB and SC times.

2. The difference is calculated and stored in the ceb_sc_tab.

3. CEB times that come down add the latest delta to the CEB time which yields SC time.

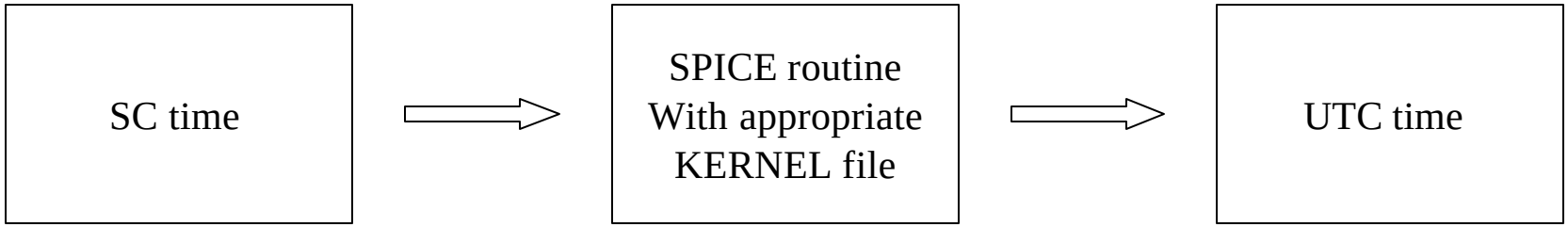


CEB Time Calculations

S/C to UTC Conversion

1. SC times are passed into a SPICE routine.

2. UTC is returned.



Time Conversion Example

Gamma packet

sc_recv_time = 179817852914
ceb_time = 4112533037

Find the delta in the ceb_sc_tab that has the
Max sc_time <= sc_recv_time

ceb_sc_tab

sc_time = 179817812682
delta = 698300927

Find the pixel period from the
Parameter table where
Max sc_recv_time <= sc_recv_time

gamma_pixel_duration = 19758

(4112533037 + (19758 / 2)) / 1000 + 698300927 = 702413469.916sec

Time Conversion Example - Continued

Divide 702413469.916sec
Into seconds 702413469
and 256^{th} . 916 x 256 = 234.496

Create the string for the spice call
702413469.234

Header Table

sc_ev_time = 179817849784
utc = 4/4/2002 6:50:14 PM

- Call scdecd_c to get a clock string
- Call scs2e_c to get ephemeris time
- Call timeout_c to get UTC format