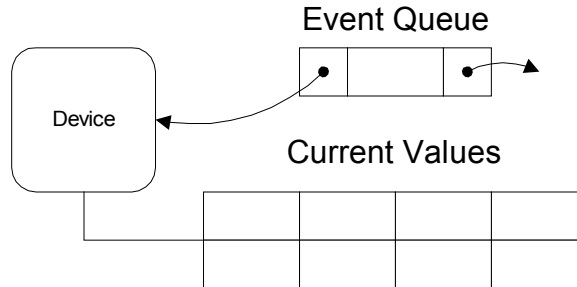


TECHNICAL NOTE 1: IECPT TRANSMISSION OF CLASS 1 AND 2 DATA

This technical note provides additional help for understanding IECPT transmission of Class 1 and Class 2 data. The following figure shows the event queue, the current values array, and the device.



The IECPT uses the queue to respond to IEC requests for Class 1 data; the IECPT uses the current values array to service requests for Class 2 data.

Setting Transmission Frequency of Class 2 Data

A user-specified multiplier applied to a user-specified base frequency determines the frequency at which the IECPT transmits Class 2 data for an information type. The IEC property `IPROP_IEC_TRANSMISSION_FREQUENCY` sets the base transmission frequency. This property takes a value expressed in milliseconds. The default value is 30,000, making the base Class 2 transmission frequency 30 seconds:

$$\text{IPROP_IEC_TRANSMISSION_FREQUENCY} = 30,000$$

The multiplier that the IECPT applies to the base frequency is in the `IECOBJECTS` table that the user application passes to the IECPT during configuration. The following table comes from the source code file `ieccfg.c` that is included in the product package.

```
static IECOBJECTS IecObjects[IEC_MAX_OBJECTS] = {  
    UNSUPPORTED,  
    USER( IEC_CLASS_2 | IEC_CLASS_GENERAL, C2, 1, USER_IEC_SINGLE_INPUT ),  
    USER( IEC_CLASS_1, C1, 0, USER_IEC_SINGLE_INPUT ),
```

The third argument to the user macro is the multiplier. For example, in the sample code above, the multiplier for the IEC single information type has been defined as 1. Therefore, the IECPT transmits current values for the single information type to the controlling station every $1 * \text{IPROP_IEC_TRANSMISSION_FREQUENCY}$ number of milliseconds, or every 30 seconds.

Note: If $IPROP_IEC_TRANSMISSION_FREQUENCY = 0$, the IECPT does not transmit Class 2 data in the background. The IECPT continues to transmit Class 1 events and to respond to device interrogation, but no periodic transmission of Class 2 data occurs.

TRANSMISSION OF CLASS 1 DATA

The IECPT obtains Class 1 data from the device event queue. This queue is a priority-ordered queue. The user application maintains the ordering of events within the queue. The IECPT reads the queue from beginning to end. The IECPT uses the ACD bit to signal the presence of Class 1 data to the controlling station. The basic logic for setting the ACD bit is as follows:

```
    If (queue empty)
    Then
        ACD = 0
    Else
        ACD = 1
```

Where the user application inserts an event in the queue determines when the IECPT transmits the event to the controlling station. The sample event queue manager that shipped with the IECPT supports three levels of priority when inserting events into the queue: `QUEUE_PRIORITY_DEVICE`, `QUEUE_PRIORITY_HIGH`, and `QUEUE_PRIORITY_LOW`. The sample event queue manager (to be adapted or replaced by user software) interprets these as follows:

- **QUEUE_PRIORITY_DEVICE.** The event queue manager always inserts the event at the front of the queue, so that it is the first event that the IECPT reports on the next Class 1 scan. The event queue manager uses this priority for the `LOCAL_RESET` device event.
- **QUEUE_PRIORITY_HIGH.** The event queue manager inserts the event in the front of the queue after the last high priority event, but before the first low priority event. Examples of high priority events include control termination events.
- **QUEUE_PRIORITY_LOW.** The event queue manager inserts the event at the back of the queue after the last low priority event. Examples of low priority events include all single changes.

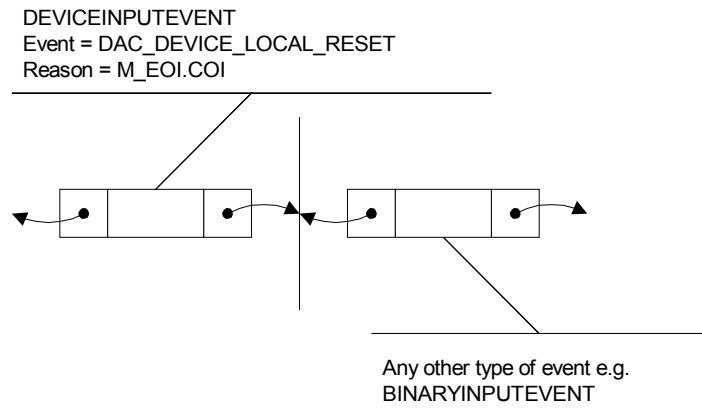
The sample software uses only these queue priority levels. The user is free to define additional levels for inserting events into the queue. The IECPT always returns events to the controlling station in queue order.

The following sections describe rules for inserting events into the queue.

End of Initialization

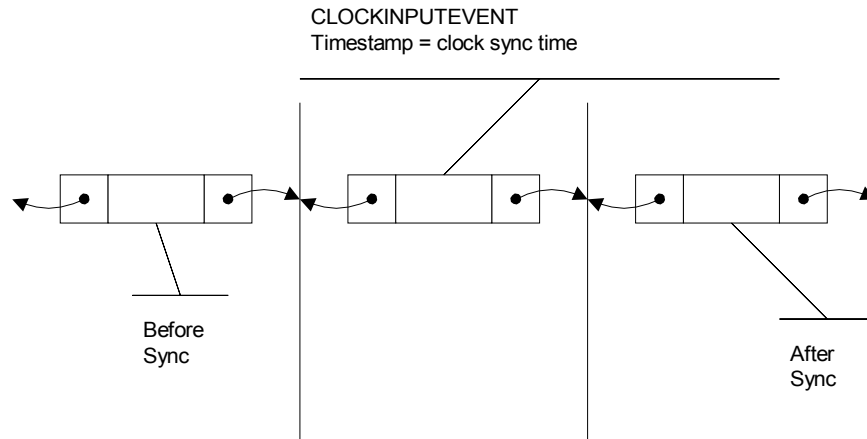
The End of Initialization (`M_EOI`) ASDU is optional. If the user application wants to transmit the `M_EOI` ASDU, the user application should insert a device event at the front of the queue (`QUEUE_PRIORITY_DEVICE`) as illustrated in the following figure:

Technical Note 1: IECPT Transmission of Class 1 and Class 2 Data



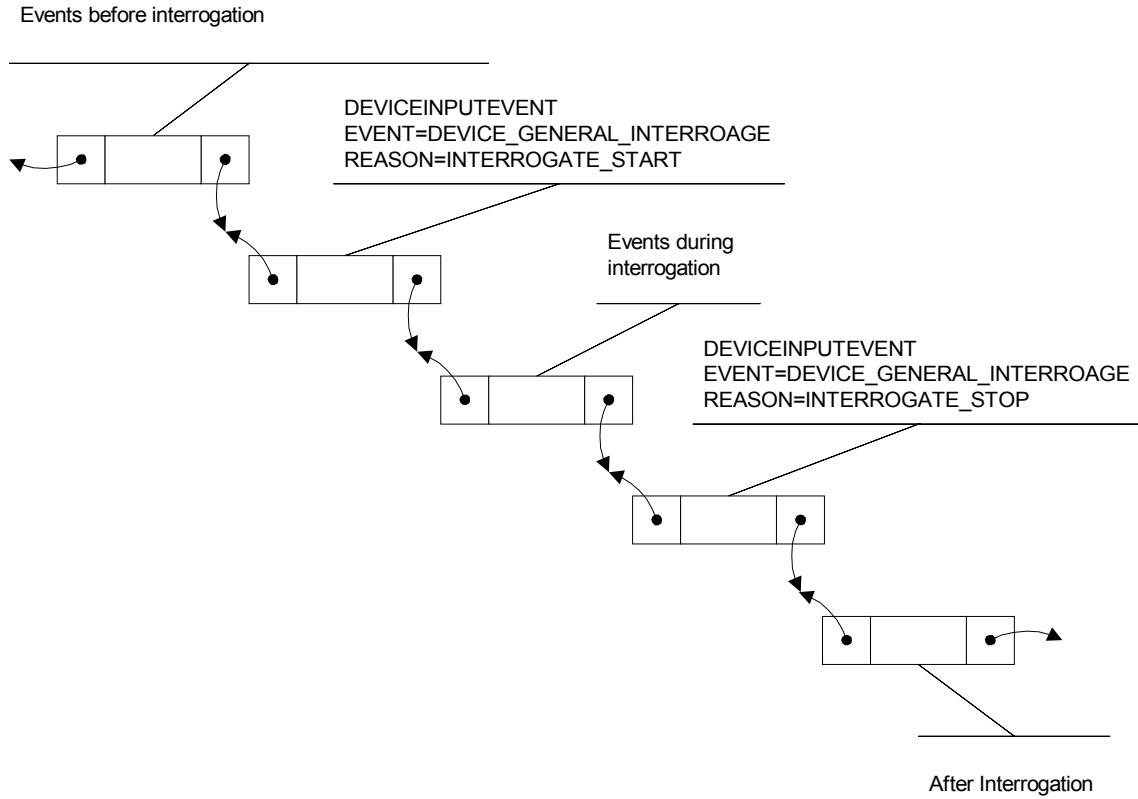
Clock Sync

When the user application accepts a clock sync, the user application should insert a CLOCKINPUTEVENT into the event queue to distinguish events that occurred prior to the clock sync from events that occurred after the clock sync. The following figure illustrates this relationship.



Interrogation

If the user application accepts an interrogation, the IECPT expects there to be two marker events in the event queue. These marker events identify events that occurred prior to the start of interrogation, during the interrogation, and after the interrogation.



Control Terminations

The user application may optionally send the Control ACTERM ASDU to the controlling station by inserting a control completion event into the event queue, as follows (QUEUE_PRIORITY_HIGH):

