**CONTEXT** C_Part_Proc_Manage
**EXTENDS** C_Part_Proc_With_Events
**SETS**

DEADLINE_TYPE
PARTITION_STARTCONDITIONS
PROCESS_WAIT_TYPES

**CONSTANTS**

Period_of_Partition
Duration_of_Partition
SystemPartFlag_of_Partition
DEADLINE_HARD
DEADLINE_SOFT
NORMAL_START
PARTITION_RESTART
HM_MODULE_RESTART
HM_PARTITION_RESTART
PROC_WAIT_DELAY
PROC_WAIT_TIMEOUT
PROC_WAIT_PERIOD
PROC_WAIT_OBJ
PROC_WAIT_PARTITIONNORMAL
partitionTimeWindows
timeWindowsofPartition
majorFrame
periodicprocstart_timeWindow_of_Partition
firstperiodicprocstart_timeWindow_of_Partition
MAX_LOCK_LEVEL
MIN_PRIORITY
MAX_PRIORITY
INFINITE_TIME_VALUE
ONE_TICK_TIME
part_sched_list
periodicStartPoint
partition2num

**AXIOMS**

axm_period_of_part: $Period\_of\_Partition \in PARTITIONS \pfun \mathbb{N}$
axm_duration_of_part: $Duration\_of\_Partition \in PARTITIONS \pfun \mathbb{N}$
axm_syspartflag_of_part: $SystemPartFlag\_of\_Partition \in PARTITIONS \pfun BOOL$
axm_deadlinetype_of_part: $partition(DEADLINE\_TYPE, \{DEADLINE\_HARD\}, \{DEADLINE\_SOFT\})$
axm_startconditions_of_part: $partition(PARTITION\_STARTCONDITIONS, \{NORMAL\_START\}, \{PARTITIO$
axm_proc_wait_types: $partition(PROCESS\_WAIT\_TYPES, \{PROC\_WAIT\_DELAY\}, \{PROC\_WAIT\_TIMEOUT\},$
axm_part_time_window: $partitionTimeWindows \in (\mathbb{N} \times \mathbb{N}) \pfun BOOL$
axm_timewindowsofpart: $timeWindowsofPartition \in partitionTimeWindows \tfun PARTITIONS$
axm_majorframe: $majorFrame \in \mathbb{N}_1$
axm_periodicprostart_twp: $periodicprocstart\_timeWindow\_of\_Partition \in partitionTimeWindows \pfun PARTITIONS$
axm_firstperiodicprstart_twp: $firstperiodicprocstart\_timeWindow\_of\_Partition \in PARTITIONS \tinj partitionTimeWindows$
axmmajorframe_value: $(\exists x, y \cdot (x \mapsto y \in dom(partitionTimeWindows) \Rightarrow x + y = majorFrame)) \land (\forall x, y \cdot (x \mapsto y \in dom(partitionTimeWindows) \Rightarrow x + y \leq majorFrame))$

axm_min_partwindow_eque_0: $\exists x, y \cdot (x \mapsto y \in dom(partitionTimeWindows) \Rightarrow x = 0)$

axm_atleast_oneperiodicprocstart_for_eachpart: $\forall p \cdot (p \in PARTITIONS \Rightarrow (\exists x, y \cdot (((x \mapsto y) \mapsto TRUE) \in periodicprocstart\_timeWindow\_of\_Partition^{-1}[\{p\}])))$

axm_perprocstart_with_partwin:
$(\forall x, y, b, p \cdot ((x \mapsto y \mapsto b \mapsto p) \in periodicprocstart\_timeWindow\_of\_Partition \Rightarrow b = TRUE \wedge timeWindowsofPartition(x \mapsto y \mapsto b) = p)) \wedge$
$(\forall x, y, b, p \cdot ((x \mapsto y \mapsto b \mapsto p) \in timeWindowsofPartition \wedge b = TRUE \Rightarrow (x \mapsto y \mapsto b \mapsto p) \in periodicprocstart\_timeWindow\_of\_Partition))$

axm_frstperiodicprocstart_twp2: $\forall x, y, b, p \cdot ((p \mapsto (x \mapsto y \mapsto b)) \in firstperiodicprocstart\_timeWindow\_of\_Partition \Rightarrow ((x \mapsto y \mapsto b) \mapsto p) \in periodicprocstart\_timeWindow\_of\_Partition)$

axm_frstperiodicprocstart_twp3: $\forall x, y, b, p \cdot ((p \mapsto (x \mapsto y \mapsto b)) \in firstperiodicprocstart\_timeWindow\_of\_Partition \Rightarrow \neg(\exists x1, y1, b1, p1 \cdot (((x1 \mapsto y1 \mapsto b1) \mapsto p1) \in periodicprocstart\_timeWindow\_of\_Partition \wedge p = p1 \wedge x1 < x)))$

axm_majorframe_value2: $\forall x \cdot (x \in ran(Period\_of\_Partition) \Rightarrow \exists y \cdot (y \in \mathbb{N}_1 \wedge x * y = majorFrame))$

axm_max_lock_level: $MAX\_LOCK\_LEVEL = 32$

axm1_minvalue_priority: $MIN\_PRIORITY = 0$

axm_maxvalue_priority: $MAX\_PRIORITY = 249$

axm_infinite_timevalue: $INFINITE\_TIME\_VALUE = 0$

axm_one_tick_time: $ONE\_TICK\_TIME = 20$

axm_partitionID: $partition2num \in PARTITIONS \rightarrowtail \mathbb{N}$

axm_part_sched_list: ⟨theorem⟩ $part\_sched\_list \in \mathbb{N} \rightarrow (\mathbb{N} \times \mathbb{N})$

axm_part_sched_list1: ⟨theorem⟩ $\forall p \cdot p < card(PARTITIONS) \Rightarrow (\exists offset, dur \cdot part\_sched\_list(p) = (offset \mapsto dur))$

axm_part_sched_list2: ⟨theorem⟩ $\forall p \cdot p < card(PARTITIONS) \wedge (p + 1) < card(PARTITIONS) \Rightarrow (\exists offset, dur, offset\_1, dur\_1 \cdot part\_sched\_list(p) = (offset \mapsto dur) \wedge part\_sched\_list(p+1) = (offset\_1 \mapsto dur\_1) \wedge offset\_1 \geq offset + dur)$

axm_major_time_window_value: $\exists offset, dur \cdot part\_sched\_list(card(PARTITIONS) - 1) = (offset \mapsto dur) \Rightarrow offset + dur = majorFrame$

axm_periodicStartPoint: $periodicStartPoint \in \mathbb{N} \rightarrow \mathbb{N}$

axm_periodicStartPoint1: $\forall p \cdot p < card(PARTITIONS) \Rightarrow (\exists offset, dur, periodic\_start\_point \cdot part\_sched\_list(p) = (offset \mapsto dur) \wedge periodicStartPoint(p) = periodic\_start\_point \wedge periodic\_start\_point \geq offset \wedge periodic\_start\_point < offset + dur)$

**END**