CONTEXT Ctr_IPC
EXTENDS C_Part_Proc_Manage
SETS

PORTS
PORT_DIRECTIONS
PORT_MODES
QUEUING_DISCIPLINE
MESSAGES
BUFFERS
BLACKBOARDS
SEMAPHORES
EVENTS
MUTEXS
BufferWaitingTypes
BLACKBOARDS_INDICATORTYPE
EVENT_STATE
MUTEX_STATE

CONSTANTS

SamplingPorts
QueuingPorts
Source_QueuingPorts
Dest_QueuingPorts
Source_SamplingPorts
Dest_SamplingPorts
Sampling_Channels
Queuing_Channels
PORT_SOURCE
PORT_DESTINATION
QUEUE_FIFO
QUEUE_PRIORITY
Ports_of_Partition
Mode_of_Ports
PORT_MODE_SAMPLING
PORT_MODE_QUEUING
Direction_of_Ports
MaxMsgSize_of_Ports
MaxMsgNum_of_QueuingPorts
WAITING_R
WAITING_W
BB_EMPTY
BB_OCCUPIED
EVENT_UP
EVENT_DOWN
MUTEX_AVAILABLE
MUTEX_OWNED

AXIOMS

axm_finite_ports: $finite(PORTS)$
axm_finite_msg: $finite(MESSAGES)$
axm_ports_partition: $partition(PORTS, SamplingPorts, QueuingPorts)$
axm_queueports_partition: $partition(QueuingPorts, Source\_QueuingPorts, Dest\_QueuingPorts)$
axm_sampports_partition: $partition(SamplingPorts, Source\_SamplingPorts, Dest\_SamplingPorts)$
axm_samp_channels: $Sampling\_Channels \in Dest\_SamplingPorts \twoheadrightarrow Source\_SamplingPorts$

axm_que_channels: $Queuing\_Channels \in Source\_QueuingPorts \rightarrowtail\!\!\!\!\twoheadrightarrow Dest\_QueuingPorts$

axm_portdirect_partition: $partition(PORT\_DIRECTIONS, \{PORT\_SOURCE\}, \{PORT\_DESTINATION\})$

axm_portmode_partition: $partition(PORT\_MODES, \{PORT\_MODE\_SAMPLING\}, \{PORT\_MODE\_QUEUING\})$

axm_quediscipline: $partition(QUEUING\_DISCIPLINE, \{QUEUE\_FIFO\}, \{QUEUE\_PRIORITY\})$

axm_protsofpartition: $Ports\_of\_Partition \in PORTS \rightarrow PARTITIONS$

axm_modeofports: $Mode\_of\_Ports \in PORTS \rightarrow PORT\_MODES$

axm_directofports: $Direction\_of\_Ports \in PORTS \rightarrow PORT\_DIRECTIONS$

axm_maxmsgsize_of_ports: $MaxMsgSize\_of\_Ports \in PORTS \rightarrow \mathbb{N}_1$

axm_maxmsgnum_of_queports: $MaxMsgNum\_of\_QueuingPorts \in QueuingPorts \rightarrow \mathbb{N}_1$

axm_srcport_direct: $\forall p\cdot(p \in (Source\_SamplingPorts \cup Source\_QueuingPorts) \Rightarrow Direction\_of\_Ports(p) = PORT\_SOURCE)$

axm_destport_direct: $\forall p\cdot(p \in (Dest\_SamplingPorts \cup Dest\_QueuingPorts) \Rightarrow Direction\_of\_Ports(p) = PORT\_DESTINATION)$

axm_sampports: $SamplingPorts = Mode\_of\_Ports^{-1}[\{PORT\_MODE\_SAMPLING\}]$

axm_queueports: $QueuingPorts = Mode\_of\_Ports^{-1}[\{PORT\_MODE\_QUEUING\}]$

axm_src_sampports: $Source\_SamplingPorts = SamplingPorts \cap Direction\_of\_Ports^{-1}[\{PORT\_SOURCE\}]$

axm_dest_sampports: $Dest\_SamplingPorts = SamplingPorts \cap Direction\_of\_Ports^{-1}[\{PORT\_DESTINATION\}]$

axm_src_queueports: $Source\_QueuingPorts = QueuingPorts \cap Direction\_of\_Ports^{-1}[\{PORT\_SOURCE\}]$

axm_dest_queueports: $Dest\_QueuingPorts = QueuingPorts \cap Direction\_of\_Ports^{-1}[\{PORT\_DESTINATION\}]$

axm_finite_buffers: $finite(BUFFERS) \land card(BUFFERS) = 1024$

axm_finite_blackboards: $finite(BLACKBOARDS) \land card(BLACKBOARDS) = 1024$

axm_buffer_waiting_types: $partition(BufferWaitingTypes, \{WAITING\_R\}, \{WAITING\_W\})$

axm_bb_indicator: $partition(BLACKBOARDS\_INDICATORTYPE, \{BB\_EMPTY\}, \{BB\_OCCUPIED\})$

axm_finite_semaphore: $finite(SEMAPHORES) \land card(SEMAPHORES) = 1024$

axm_event_state: $partition(EVENT\_STATE, \{EVENT\_UP\}, \{EVENT\_DOWN\})$

axm_finite_event: $finite(EVENTS) \land card(EVENTS) = 1024$

axm_mutex_states: $partition(MUTEX\_STATE, \{MUTEX\_AVAILABLE\}, \{MUTEX\_OWNED\})$

END