```
context Ctx_IPC
//* ************************************************
//    The Event-B model of ARINC 653 Part 1
//    Created by Yongwang Zhao ( zhaoyongwang@gmail.com)
//    National Key Laboratory of Software Development Environment (NLSDE)
//    School of Computer and Engineering, Beihang University, Beijing, China
//    ************************************************/
extends Ctx_PartProc_Manage

sets PORTS //port set which is configured by system integrator in the configuration file
    PORT_DIRECTIONS //port direction type
    PORT_MODES //port mode type
    MESSAGES //the set of communication msg
    QUEUING_DISCIPLINE //the queueing descipline
    BLACKBOARD_INDICATORTYPE

    EVENT_STATE

    BUFFERS
    BLACKBOARDS
    SEMAPHORES
```

EVENTS

BufferWaitingTypes

constants PORT_SOURCE PORT_DESTINATION //port directions: source and destination
PORT_MODE_SAMPLING PORT_MODE_QUQUING //port modes: sampling or queuing

QUEUE_FIFO QUEUE_PRIORITY

BB_EMPTY BB_OCCUPIED

EVENT_UP EVENT_DOWN

SamplingPorts QueuingPorts //two parttion set of the PORTS set
Source_SamplingPorts Dest_SamplingPorts //two partition set of samplingports: src and dest
Source_QueuingPorts Dest_QueuingPorts //two partition set of queuingports: src and dest
Sampling_Channels
Queuing_Channels

Ports_of_Partition

Mode_of_Ports
Direction_of_Ports

MaxMsgSize_of_Ports
MaxMsgNum_of_QueuingPorts

WAITING_R
WAITING_W

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** ∈ **Dest_SamplingPorts** ⇸ **Source_SamplingPorts** *//total surjection*
@axm_que_channels **Queuing_Channels** ∈ **Dest_QueuingPorts** ⇸ **Source_QueuingPorts** *//total surjection*

@axm_portdirect_partition partition(PORT_DIRECTIONS,{PORT_SOURCE},{PORT_DESTINATION})
@axm_portmode_partition partition(PORT_MODES,{PORT_MODE_SAMPLING},{PORT_MODE_QUQUING})

@axm_quediscipline partition(QUEUING_DISCIPLINE,{QUEUE_FIFO},{QUEUE_PRIORITY})

@axm_bbindicator partition(BLACKBOARD_INDICATORTYPE,{BB_EMPTY},{BB_OCCUPIED})
@axm_event_state partition(EVENT_STATE,{EVENT_UP},{EVENT_DOWN})

@axm_portsofpartition Ports_of_Partition∈PORTS→PARTITIONS *//total function: each port belongs to a partition*
@axm_modeofports Mode_of_Ports∈PORTS→ PORT_MODES
@axm_directofports Direction_of_Ports∈PORTS→ PORT_DIRECTIONS
@axm_maxmsgsize_of_ports MaxMsgSize_of_Ports∈PORTS → ℕ1
@axm_maxmsgnum_of_queports MaxMsgNum_of_QueuingPorts ∈ QueuingPorts → ℕ1

@axm_srcport_direct ∀p·(p∈(Source_SamplingPorts∪Source_QueuingPorts)⇒ Direction_of_Ports(p)=PORT_SOURCE)
@axm_destport_direct ∀p·(p∈(Dest_SamplingPorts∪Dest_QueuingPorts)⇒ Direction_of_Ports(p)=PORT_DESTINATION)

@axm_sampports SamplingPorts = Mode_of_Ports~[{PORT_MODE_SAMPLING}]

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    @axm_queueports QueuingPorts = Mode_of_Ports~[{PORT_MODE_QUQUING}]
    @axm_src_sampports Source_SamplingPorts = SamplingPorts ∩ Direction_of_Ports~[{PORT_SOURCE}]
    @axm_dest_sampports Dest_SamplingPorts = SamplingPorts ∩
Direction_of_Ports~[{PORT_DESTINATION}]
    @axm_src_queueports Source_QueuingPorts = QueuingPorts ∩ Direction_of_Ports~[{PORT_SOURCE}]
    @axm_dest_queueports Dest_QueuingPorts = QueuingPorts ∩
Direction_of_Ports~[{PORT_DESTINATION}]

    @axm_finite_buffers finite(BUFFERS) ∧ card(BUFFERS)=1024
    @axm_finite_blackboards finite(BLACKBOARDS) ∧ card(BLACKBOARDS)=1024
    @axm_finite_semaphores finite(SEMAPHORES) ∧ card(SEMAPHORES)=1024
    @axm_finite_events finite(EVENTS) ∧ card(EVENTS)=1024

   @axm_waiting_types partition(BufferWaitingTypes,{WAITING_R},{WAITING_W})
end
```