SPMROOTCR_EL3, System Performance Monitors Root and Realm Control Register

The SPMROOTCR_EL3 characteristics are:

Purpose

Controls observability of Root and Realm events by System PMU <s>.

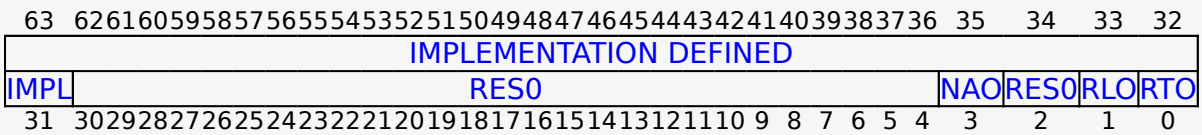
Configuration

This register is present only when FEAT_RME is implemented and FEAT_SPMU is implemented. Otherwise, direct accesses to SPMROOTCR_EL3 are undefined.

Attributes

SPMROOTCR_EL3 is a 64-bit register.

Field descriptions



IMPLEMENTATION DEFINED, bits [63:32]

implementation defined observation controls. Additional implementation defined bits to control certain types of filter or events.

IMPL, bit [31]

Indicates SPMROOTCR_EL3 is present.

The reset behavior of this field is:

- On a Warm reset, this field resets to an architecturally unknown value.

Access to this field is **RO**.

Bits [30:4]

Reserved, res0.

NAO, bit [3]
When System PMU <s> can count or monitor non-attributable events:

Non-attributable Observation. Controls whether events or monitorable characteristics not attributable with any source can be monitored.

NAO	Meaning
0b0	Events not attributable with any event source are not counted.
0b1	Counting non-attributable events is not prevented by this field.

When both SPMROOTCR_EL3 and SPMSCR_EL1 are implemented, non-attributable events are counted only if both SPMROOTCR_EL3.NAO is 1 and SPMSCR_EL1.{NAO, SO} is nonzero.

SPMROOTCR_EL3.NAO has the opposite reset polarity to SPMSCR_EL1.NAO.

The reset behavior of this field is:

- On a Warm reset, this field resets to 1.

Otherwise:

Reserved, res0.

Bit [2]

Reserved, res0.

RLO, bit [1]

Realm Observation. Controls whether events or monitorable characteristics attributable to a Realm event source can be monitored.

RLO	Meaning
0b0	Events attributable to a Realm event source are not counted.
0b1	Events attributable to a Realm event source are counted.

The reset behavior of this field is:

- On a Warm reset, this field resets to 0.

RTO, bit [0]

Root Observation. Controls whether events or monitorable characteristics attributable to a Root event source can be monitored.

RTO	Meaning
0b0	Events attributable to a Root event source are not counted.
0b1	Events attributable to a Root event source are counted.

The reset behavior of this field is:

- On a Warm reset, this field resets to 0.

Accessing SPMROOTCR_EL3

To access SPMROOTCR_EL3 for System PMU <s>, set SPMSELR_EL0.SYSPMUSEL to s.

Accesses to this register use the following encodings in the System register encoding space:

MRS <Xt>, SPMROOTCR_EL3

op0	op1	CRn	CRm	op2
0b10	0b110	0b1001	0b1110	0b111

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    UNDEFINED;
elsif PSTATE.EL == EL2 then
    UNDEFINED;
elsif PSTATE.EL == EL3 then
    X[t, 64] =
SPMROOTCR_EL3[UInt(SPMSELR_EL0.SYSPMUSEL)];
```

MSR SPMROOTCR_EL3, <Xt>

op0	op1	CRn	CRm	op2
0b10	0b110	0b1001	0b1110	0b111

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    UNDEFINED;
elsif PSTATE.EL == EL2 then
    UNDEFINED;
elsif PSTATE.EL == EL3 then
    SPMROOTCR_EL3[UInt(SPMSELR_EL0.SYSPMUSEL)] =
X[t, 64];
```

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