

## SP\_EL1, Stack Pointer (EL1)

The SP\_EL1 characteristics are:

### Purpose

Holds the stack pointer associated with EL1. When executing at EL1, the value of [SPSel.SP](#) determines the current stack pointer:

SPSel.SP	Current stack pointer
0b0	<a href="#">SP_EL0</a>
0b1	<a href="#">SP_EL1</a>

### Configuration

There are no configuration notes.

### Attributes

SP\_EL1 is a 64-bit register.

### Field descriptions

63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Stack pointer																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Stack pointer																															

### Bits [63:0]

Stack pointer.

The reset behavior of this field is:

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

### Accessing SP\_EL1

This accessibility information only applies to accesses using the MRS or MSR instructions.

When the value of [SPSel.SP](#) is 1, this register is also accessible at EL1 as the current stack pointer.

## Note

When the value of [SPSel.SP](#) is 0, [SP\\_EL0](#) is used as the current stack pointer at all Exception levels.

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

## MRS <Xt>, SP\_EL1

op0	op1	CRn	CRm	op2
0b11	0b100	0b0100	0b0001	0b000

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.<NV2,NV> == '11' then
        X[t, 64] = NVMem[0x240];
    elsif EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elsif PSTATE.EL == EL2 then
    X[t, 64] = SP_EL1;
elsif PSTATE.EL == EL3 then
    X[t, 64] = SP_EL1;
```

## MSR SP\_EL1, <Xt>

op0	op1	CRn	CRm	op2
0b11	0b100	0b0100	0b0001	0b000

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.<NV2,NV> == '11' then
        NVMem[0x240] = X[t, 64];
    elsif EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elsif PSTATE.EL == EL2 then
    SP_EL1 = X[t, 64];
elsif PSTATE.EL == EL3 then
```

```
SP_EL1 = X[t, 64];
```

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