

## AT S12E1R, Address Translate Stages 1 and 2 EL1 Read

The AT S12E1R characteristics are:

### Purpose

Performs stage 1 and 2 address translation, with permissions as if reading from the given virtual address from EL1, or from EL2 if the Effective value of [HCR\\_EL2](#).{E2H, TGE} is {1, 1}, using the following translation regime:

- When EL2 is implemented and enabled in the Security state described by the current Effective value of [SCR\\_EL3](#).{NSE, NS}:
  - If [HCR\\_EL2](#).{E2H, TGE} is not {1, 1}, the EL1&0 translation regime, accessed from EL1.
  - If [HCR\\_EL2](#).{E2H, TGE} is {1, 1}, the EL2&0 translation regime, accessed from EL2.
- Otherwise, the EL1&0 translation regime, accessed from EL1.

When FEAT\_RME is implemented, if the Effective value of [SCR\\_EL3](#).{NSE, NS} is a reserved value, this instruction is undefined at EL3.

### Configuration

There are no configuration notes.

### Attributes

AT S12E1R is a 64-bit System instruction.

### 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
Input address for translation																															
Input address for translation																															
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

#### Bits [63:0]

Input address for translation. The resulting address can be read from the [PAR\\_EL1](#).

If the address translation instructions are targeting a translation regime that is using AArch32, and so has a VA of only 32 bits, then VA[63:32] is res0.

## Executing AT S12E1R

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

### AT S12E1R, <Xt>

op0	op1	CRn	CRm	op2
0b01	0b100	0b0111	0b1000	0b100

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elseif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elseif PSTATE.EL == EL2 then
    if HCR_EL2.<E2H,TGE> == '11' || HCR_EL2.<DC,VM>
    == '00' then
        AArch64.AT(X[t, 64], TranslationStage_1,
        EL1, ATAccess_Read);
    else
        AArch64.AT(X[t, 64], TranslationStage_12,
        EL1, ATAccess_Read);
elseif PSTATE.EL == EL3 then
    if !EL2Enabled() then
        AArch64.AT(X[t, 64], TranslationStage_1,
        EL1, ATAccess_Read);
    elseif EL2Enabled() && (HCR_EL2.<E2H,TGE> == '11'
    || HCR_EL2.<DC,VM> == '00') then
        AArch64.AT(X[t, 64], TranslationStage_1,
        EL1, ATAccess_Read);
    else
        AArch64.AT(X[t, 64], TranslationStage_12,
        EL1, ATAccess_Read);
```

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