

z/OS CPENABLE Settings

IBM z Systems / IBM zEnterprise / System z / zSeries Processors

Recommended CPENABLE Settings

Processor Family	Basic Mode	LPAR Dedicated	LPAR Shared
IBM z14	N/A	10,30	10,30
IBM z13s	N/A	10,30	10,30
IBM z13	N/A	10,30	10,30
IBM zEnterprise EC12	N/A	10,30	10,30
IBM zEnterprise 196	N/A	10,30	10,30
IBM zEnterprise 114	N/A	10,30	10,30
IBM System z10	N/A	10,30	10,30
IBM System z9	N/A	10,30	10, 30
zSeries 990 (2084)	N/A	10,30	10, 30
zSeries 890 (2086)	N/A	10,30	10, 30

Measurements on the z990 (2084) and z890 (2086) show improved ITR benefits of 0% - 5% when running with CPENABLE= (10,30). Environments with a high n-way and/or high I/O rates showed greater improvement, whereas when running with CPENABLE=(10,30) in lower n-way and lower I/O rates showed no difference. Thus rather than try to differentiate between certain n-ways, since low is not disadvantage the decision was made to make a single new recommendation.

Recent measurements on the IBM z13 and IBM z14 processors (z13 and z14) with Hiperdispatch have shown slight improvements in ITR with no I/O elongation. With Hiperdispatch the system will only enable as many vertical high CPs as would be needed to handle the workload, and therefore the CP(s) enabled for I/O interrupts will always have access to a physical processor.

Therefore, IBM recommends a CPENABLE=(10,30) setting for all current processors. Processors introduced prior to the IBM zSeries 890 should use the earlier recommended settings of 0,0 only for those logical partition with shared CPs.

CPENABLE is a parameter which allows z/OS to dynamically manage the number of processors which fields I/O interrupts. The original benefit of CPENABLE was to provide increased ITR in the environment by limiting the code used to process I/O interrupts to fewer CPs. This improves the locality of reference in the HSB for CPs enabled for I/O processing and provides overall ITR benefits.

With shared CPs under PR/SM, z/OS would enable logical CPs for I/O but had no control over which physical CP would be dispatched to the logical. Thus the efficiency algorithm had limited impact because there was no method to control the physical CP dispatching and reap the benefits of assigning the I/O processing to few CPs. This is why CPENABLE was set to (0,0) for a shared environment.

The reason for the recommendation is the I/O processing in modern processors provides

better throughput when there are fewer CPs in the path due to some serialization issues. CPENABLE provides this behavior. So in this case we are not worried that z/OS is enabling logicals and PR/SM is dispatching across different physical processors. Instead in this case CPENABLE does gain us the benefit of having fewer CPs in the I/O processing path.

Installations reviewing this change should review the I/O response time of their LPARs. CPENABLE is a parameter which involves a tradeoff of I/O responsiveness for throughput. It is our expectation, based on benchmark measurement across a wide range of environments, no change in I/O response times will be seen.

A new interrupt delay time measurement is available on IBM zEnterprise EC12 (zEC12), z13, and z14 servers. With z/OS V2.1, or z/OS V1.12 or V1.13 and the PTF for APAR OA39993, RMF is designed to report on interrupt delay time to help you determine whether I/O processing delays are occurring. This new measurement is designed to measure the time between when primary status is presented to the channel subsystem and when the operating system clears the primary status to begin processing the interrupt. RMF is also designed to write this information to new fields in SMF type 74 subtype 1 and SMF 79 subtype 9 records, and to display averaged interrupt delay times in the Postprocessor Device Activity report. The higher numbers in this field indicate the CPENABLE setting should be altered and a reading of zero indicates the CP is not supported by the interrupt delay time function.