*Project: RMC75E TEST BENCH*

*Module: Serial2Parallel.vhd*

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# High Level

**Description:** The "Serial2Parallel" module acts as a serial-to-parallel converter and data distributor within the RMC75E modular motion controller. It takes serial input data and converts it into parallel format, distributing the data to various output channels based on control signals.

# Low level

**Inputs:**

* SysClk: System clock signal.
* SynchedTick: Synchronized tick signal.
* CtrlAxisData: Two-bit control axis data input.
* ExpA\_DATA: Eight-bit data input for expansion module A.
* Serial2ParallelEN: Enable signal for the module.
* Serial2ParallelCLR: Clear signal for internal data registers.
* S2P\_Addr: Four-bit address input for selecting the output channel.

**Outputs:**

* S2P\_Data: Sixteen-bit parallel data output.

**Architecture:** The "Serial2Parallel\_arch" architecture contains internal signals and a process block for data conversion and distribution.

**Internal Signals:**

* Internal registers hold 16-bit data for each output channel.

**Functionality:**

1. On the rising edge of SysClk, when SynchedTick or Serial2ParallelCLR is high, all internal data registers are cleared.
2. When Serial2ParallelEN is high, data conversion and distribution are enabled. Input data is shifted into internal registers for each output channel.
3. S2P\_Data output is determined by S2P\_Addr, providing the selected output channel's data.

## Simulation

S2P\_Data output for correct serial-to-parallel conversion and distribution based on control signals. Test various scenarios, including reset, data conversion process, and output channel selection. Ensure proper functionality.