Algorithm 1 Grid Dispatch & DMA Injection (Running on AMB82-Mini)

Require: K_{config}: Kernel Configuration (Dimensions, Opcode)
Require: T_{global}: Global Tensor Data (Weights/Inputs) stored in DDR
Ensure: G_{bus}: Global G-BUS Data Stream (To ESP32)

Initialize DMA_{eng} with burst size 512 Bytes
Divide T_{global} into memory tiles $\{t_0, t_1, \ldots, t_n\}$ fit for L2 SRAM
for all tile t_i in T_{global} **do**
    {Step 1: Send Metadata Sideband}
    Push Meta(t_i) to Metadata Buffer (Shape, Precision)
    SetSignal(MD_Valid, High)
    {Step 2: Trigger Hardware Engine}
    while Signal(G_BUSY) == High **do**
        Wait {Flow control: Block until ESP32 Buffer is Free}
    end while
    {Step 3: Zero-Copy Transfer}
    $DMA_{src} \leftarrow$ Address(t_i)
    $DMA_{dst} \leftarrow$ G_BUS_PORT
    DMA_Start() {Drives 8080 Bus}
    Wait for DMA_{IRQ} (Transfer Complete)
end for
{Step 4: Kernel Launch}
SendPacket(CMD_LAUNCH)