Regbus master tunnel interface

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# Overview

The *RegBus Master Tunnel* is an interface block, which handles register access requests to RegBus Layer originating from CPUs. It is a “host” to the NoC, and acts a tunnel between NoC layers and RegBus layer. The CPUs have only one read/write port to the whole NoC and have physical access only to the regular NoC layers. The current scheme requires the customer to create an agent that has a slave port on the NoC, and then ties to the RegBus master. The CPU can issue reads on writes on their normal AXI ports to the NoC. The corresponding address for these RegBus Read/Write instructions will map to the “*RegBus Master Tunnel*” block, which will act like a “slave host”. The “*RegBus Master Tunnel*” will receive AXI read/write requests through regular NoC layer and convert them into RegBus layer requests (AXI-Lite plus), and send them out to RegBus NoC layer through its master port.

# SPECIFICATION

## NocStudio Requirements

The requirements from NocStudio are listed below:

* NocStudio to add and support a special host for *RegBus Master Tunnel* with slave port and master port
* The *RegBus Master Tunnel* would be minimally sized ( 1x1), slave port and master port can be at the same position but will talk to different layers (slave port to regular NoC layers, master port to RegBus layer)
* NocStudio can configure the address space of *RegBus Master Tunnel* of how it wants, but the *master port address register* should not be non-programmable

## Implementation specifications

* *RegBus Master Tunnel* to be implemented as single input single output slave host
* *RegBus Master Tunnel* to behave like a converter for AXI commands at its input to AXI-Lite plus commands at the output, with some additional logic for translation (TBD)
* Since the RegBus Address Space is fixed, Slave port (input) address width of *RegBus Master Tunnel* is to be fixed at 32 bits
* *RegBus Master Tunnel* throughput is going to be based on Slave port (input) data width of 32 bits.
* Current system address space for Regbus is fixed at 4GB. For any system address space smaller than 4GB, a “*remapper*” in *RegBus Master Tunnel* can be used to add an offset to the incoming address and create an effective address.
* *RegBus Master Tunnel* should only handle 8 Byte Register access for now. In future, we should be able to access both 4B and 8B Registers (variable access) as part of AXI Lite protocol. For now, there should be only 8B Register access on the Slave port of *RegBus Master Tunnel*