Communication Architecture

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Abstract—**The communication infrastructure is the backbone of the NOC system. And after determining the NOC topology for the application designing given to the communication infrastructure to the next step. The routing algorithm is selected based on both to the selected topology and design constraints.This chapter describes two of the most important tasks for the design NOC-based systems dealing with the NOC modeling, as well as the topology exploration.For this purpose, state of the art architectural solutions are the discussed and open the research topics are highlighted. Additionally, this chapter provides a description of alternative traffic models used to input the NOC domain for evaluating the efficiency of various architectural parameters. The last topics discussed in this chapter are topology synthesis and application mapping onto the derived NOC Architecture under various constraints.After topology selection,there are next step in the NOC design flow is to select the appropriate switching techniqueand routing algorithm based on the design constraints. Based on these decisions,the decisions,the design the routers and channels can begin.**

I. .INTRODUCTION

Network architecture is the design of a communication network. It is a framework of the specification for a network's physical components and their functional organization and configuration, its operational principles and procedures, as well as data formats use. The communication infrastructure is the backbone in NOC system. After determining the NOC topology of the given application, designing the communication infrastructure are the next step. The routing algorithm is selected based on both the selected topology and design constraints. In telecommunication, are the specification of a network architecture may also include a detailed description of products and services delivered via a communications network, as well as detailed rate and billing structures under which services are compensated.

II. SWITCHING TECHNIQUE

The switching technique are the defines when the input channel of the switch is connected to the output channel are selected to the routing algorithm.The Data are transmitted as messages that are splitted into packets, which are turn to splitted into flow control units (flits) and finally into physical units(phits). There Switching technique selection involves selecting the optimal granularity for the above data.

- Physical units(phits):- arethe unit of atransferred though the physical link.Essentially, it isthe bit-width or word-length of the channel and, therefore,the number of bites transmitted between routers single in a clock cycle.
- Flow control units(flits):-It is a unit of synchronization between routers,At least as large as a phit and often equil.
- Messages: It is a set of packets that typically corresponds to the complete

data transfer(transaction) between to thenodes. There are amessage could be for example an entire bus transaction from processor to memory. It is Considering that the state of the art bus protocols to allow long data bursts,a message may require to splitting themany packets

It is the two commonly used switching techniques are:

1. Packet Switching.
2. Circuit Switching.

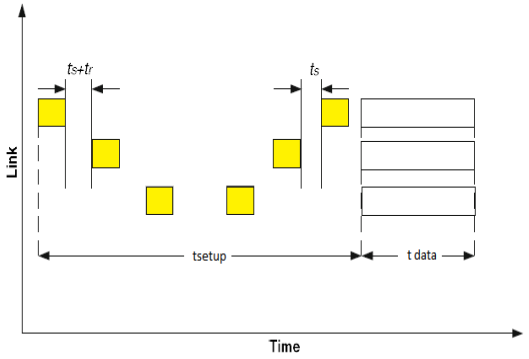
- Packets:- It is a set of consecutive it,or transmit flits separately.

III. CIRCUIT SWITCHING

In the circuit switching,are the network path between two nodes that have to exchange data are established in a advanced (before the data are sent it) by allocating the proper hardware resources to the links.Circuit switching is performed in the three stages:- of the circuit establishment(setup), data transmission, and circuit release (tear-down). And the setup procedure requires the head fit (probe) to make its way from source to destination to reserving links in these path.

When the head flit to reaches its destination, an acknowledgement is returned to the sender, to unless a link is reserved by another circuit, which case in a negative acknowledgment is sent. After a successful acknowledgment, which the case of a negative acknowledgment is send.

TheCircuit switching between thethreelinks is illustrated in the time space diagram of fig. **0.1** fs is the router switchingtime and tr the routing decision time.



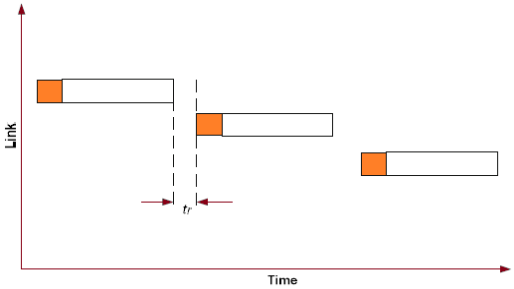
Circuit Switching

The circuit switching approach to delay can be calculated as sum of the setup time, the data transfer time and data release time:

$t_{cs} = t_{setup} + t_{data} + t_{release}$ Fig. (0.1)

V . PACKET SWITCHING

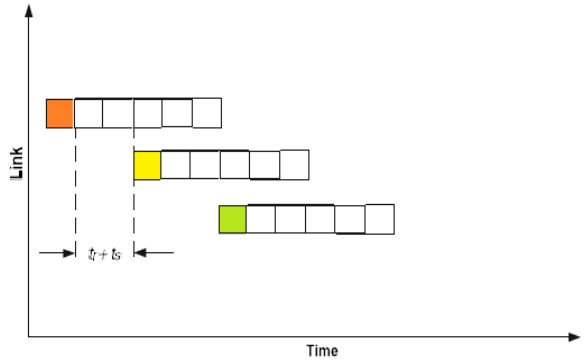
Packet switching [6] to allows the packets in a message to be transmitted though different of paths. In the order to provide efficient routing,the packet switching aretypically implies of some restrictions.



Store-And-Forward Switching

There are packet switching includes

Threesubcategries,namely:Store-And-Forward(SAF),Virtual Cut-Through(VCT),and Wormhole Switching(WS). There are the delay of a nonblocked packet in VCT switching is computed as the follows:-



Virtual Cut-Through (VCT) Switching

IV. . PACKET ROUTING

As mentioned briefly in the, tothe routing techniques for a on-chip to communication determine to the path selected by a packet to reach its destination. It is the obvious that routing is linked toclosely the target topology.

- To By name (e.g.object X)
- Adaptive:-there are path of choice between source-destination pairs is the dynamic.

V. Deadlock

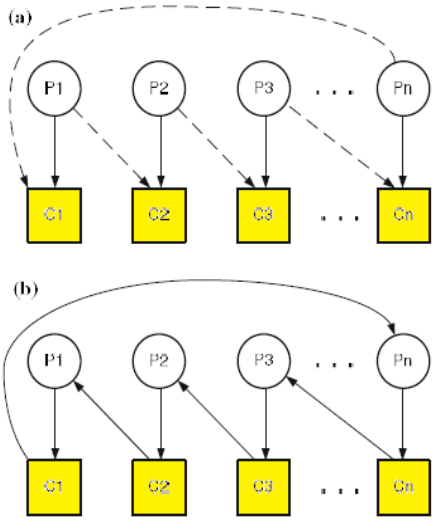
Deadlock,are the general,is condition the occurs when two the processes are each of waiting are other to the finish first,and therefore neither can the start.

VI. DEADLOCK RECOVERY

More specifically, are the deadlock recovery requires a run-time to deadlock detection mechanism,to supported by a deadlock resolution mechanism.Deadlock detection is challenging due to the distributed nature of deadlock.

VII. DEADLOCK AVOIDANCE

Deadlock avoidance are requires proof to the the NoC routing schemeis deadlock-free. To a necessary and sufficient are condition for a dead lock-free routing algorithms was introduced in [11], there are essentially the absence of cyclic dependencies in the resources required to the switching technique and routing algorithm.



Resource dependency graph to
(a) hold wait-for relations
(b) wait-for relations only are the resource.

VIII. . LIVELOCK

The Livelock is the situation where to a flit or packet is the perpetually deflected and,even though not blocked,never reaches it is the destination of either.

A. The Routing Algorithms for Regular Architectures

The Regular architectures are most commonly used ones,and the therefore a number of routing algorithms have been proposed, particularly for the highly popular mesh topology.

The partially adaptive are routing algorithms to restrict only two turns.

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