Idea behind dimension.ivy

Introduction

Basic Idea

If a packet has been to the same router 2 times within the last several moves (max moves determined by the function below + 1), then it is in livelock. See the example below showing a 2x2 NoC.

Example

State	Livelock?	r_N_10	r_E_00	r_S_01	r_W_11
0	No	0	0	0	0
1	No	1	0	0	0
2	No	1	1	0	0
3	No	1	1	1	0
4	Yes	1	1	1	1
5	Yes	2	1	1	1

Function Based on Number of Nodes

Where L represents the largest number of routers that a packet can travel between to form livelock and N represents the number of nodes on one side (Side Dimension on table).

Number of Routers: $L = 4 * (N - 1)$ Number of states to prove livelock: $S = 1 + L$

Number of Nodes	Side Dimension	Largest livelock	States Required
4	2x2	4 routers	5
9	3x3	8 routers	9
16	4x4	12 routers	13
25	5x5	16 routers	17
36	6x6	20 routers	21