

# Lecture 22 (Flow Control and Routing)

## 1 Wormhole Flow Control

1. Virtual cut through but flow control is at flit level
2. If head is stuck, then stalling happens again - Head of Line blocking

## 2 Virtual Channels

Have multiple queues (lanes) instead of a single queue

## 3 Issues in Routing

1. Deadlock
2. Livelock
3. Starvation (superset of deadlock)

## 4 Generic Solution

Introduce ageing - give priority to oldest packets

## 5 Understanding Deadlocks - Resource Dependence Graph (RDG)

1. Arrow from current location (what resource it is holding) to packet
2. Arrow from packet to what it wants
3. This deadlock can also happen with virtual channels