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Institut für  
Kommunikationsnetze

# Distributed Resource Reservation for RPR

Harmen R. van As and Roman Morawek  
Vienna University of Technology, Austria

# Content

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- **Background and Purpose**
- **The Token Signalling Protocol**
- **Simulation Results**

# Background and purpose

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## Background

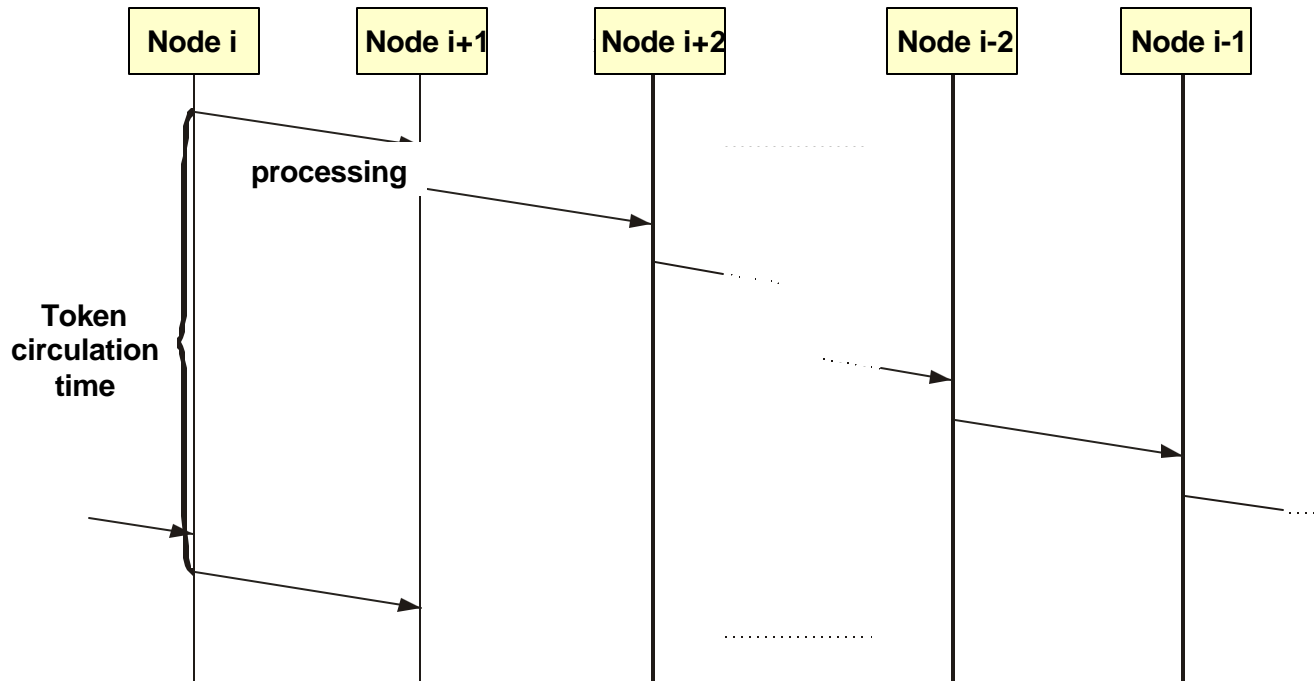
- Rings have limited hardware and interfaces
- This enables the fact that all nodes know all hardware and their states
- This can be exploited to develop an efficient and decentralized signalling protocol

## Purpose

- Controlled distribution of information and distributed resource reservation
  - SLAs (Service Level Agreements)
  - Bandwidth required for real-time connections with constant bit rates
  - OAM messages
  - Bit rates of each transmission link on the ring

# Token access

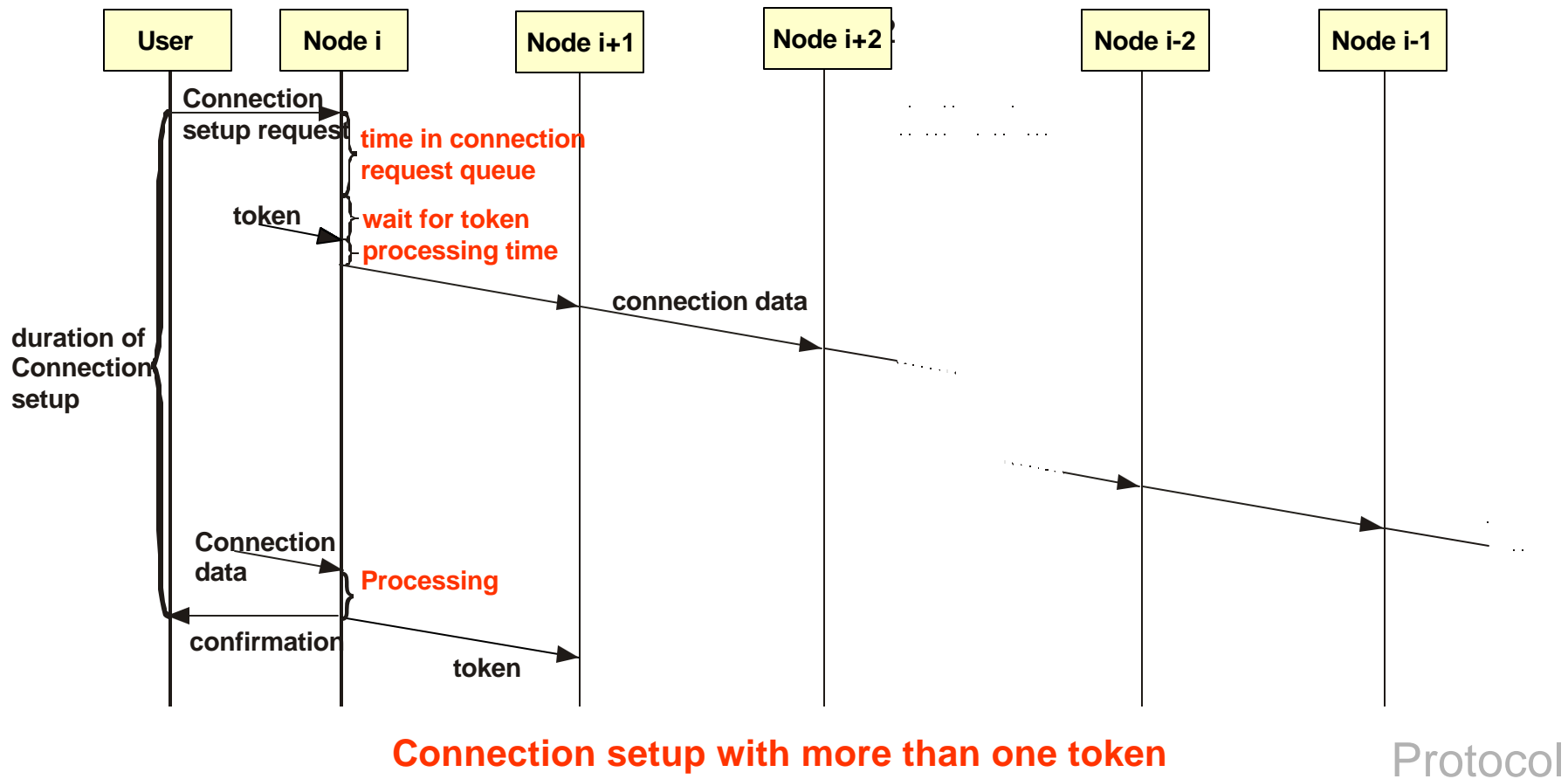
- Use of a token protocol to control distributed information exchange or distributed resource reservation



**Single token circulating on the ring**

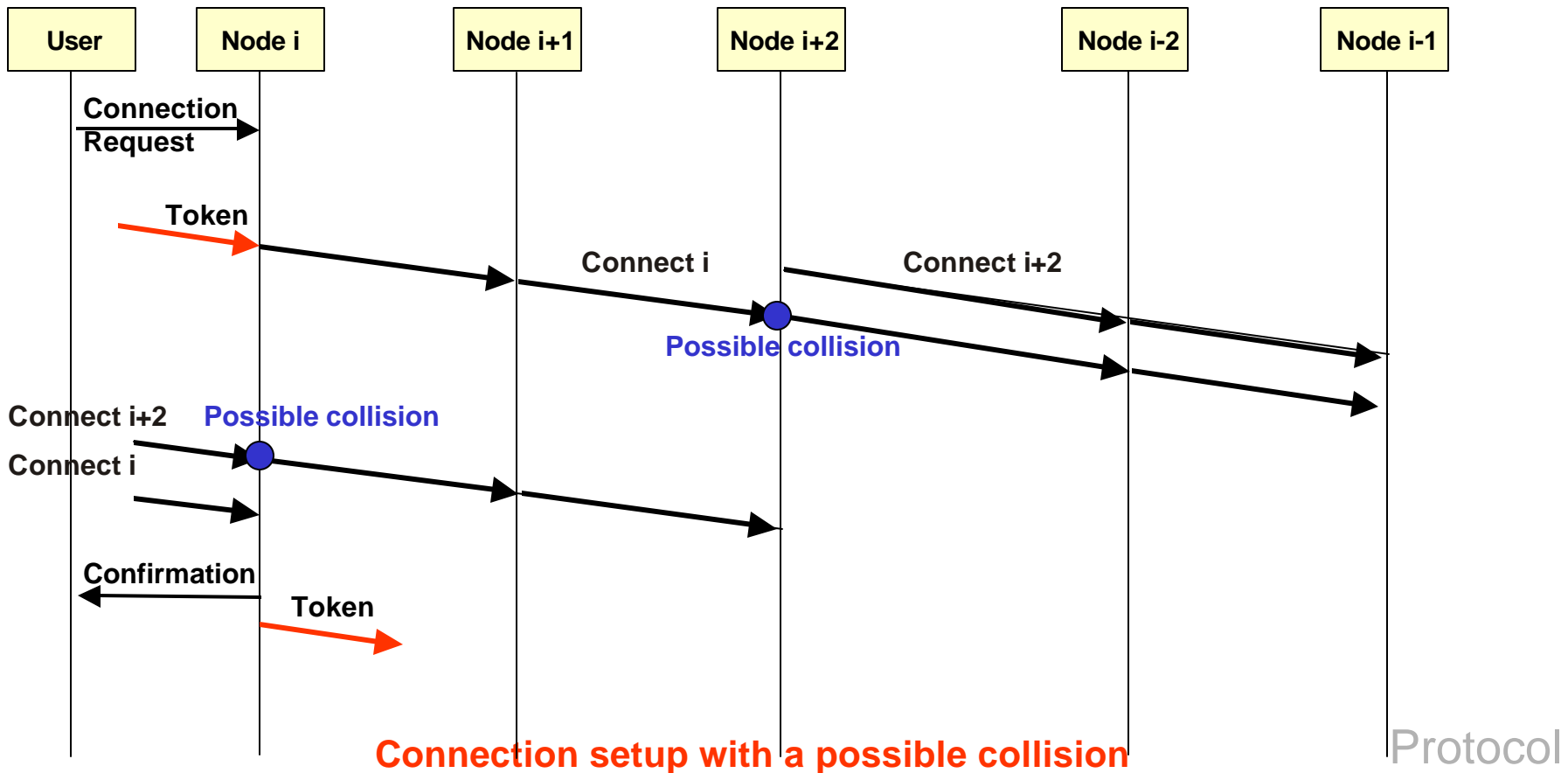
# Connection setup

- If more than one token, connection setup collisions may occur



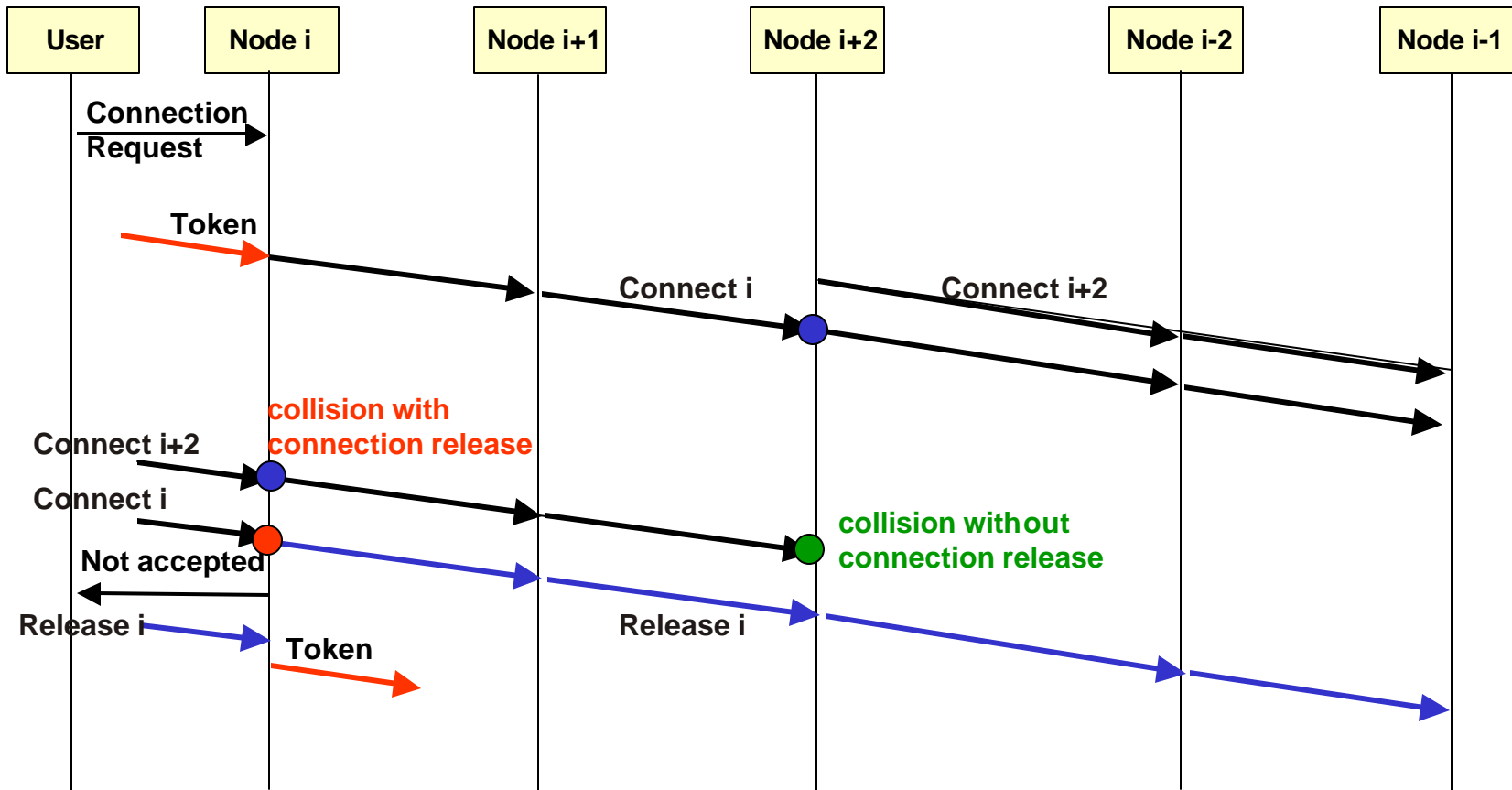
# Connection setup (possible collisions)

If a couple of nodes set up a connection in parallel, a possible collision may occur.  
Set up collision: two or more connections cannot be set up because of resource conflicts



# Connection setup (real collisions)

- In case of a setup (real) collision, the connection must be set up again



Connection setup with a possible collision

Protocol

# Simulations

- **Simulation results**

- Delay of connection setup
- Portion of potential collisions
- Portion of real collisions
- Varying the number of nodes
- Varying the ring length
- High traffic dynamics

- **Note**

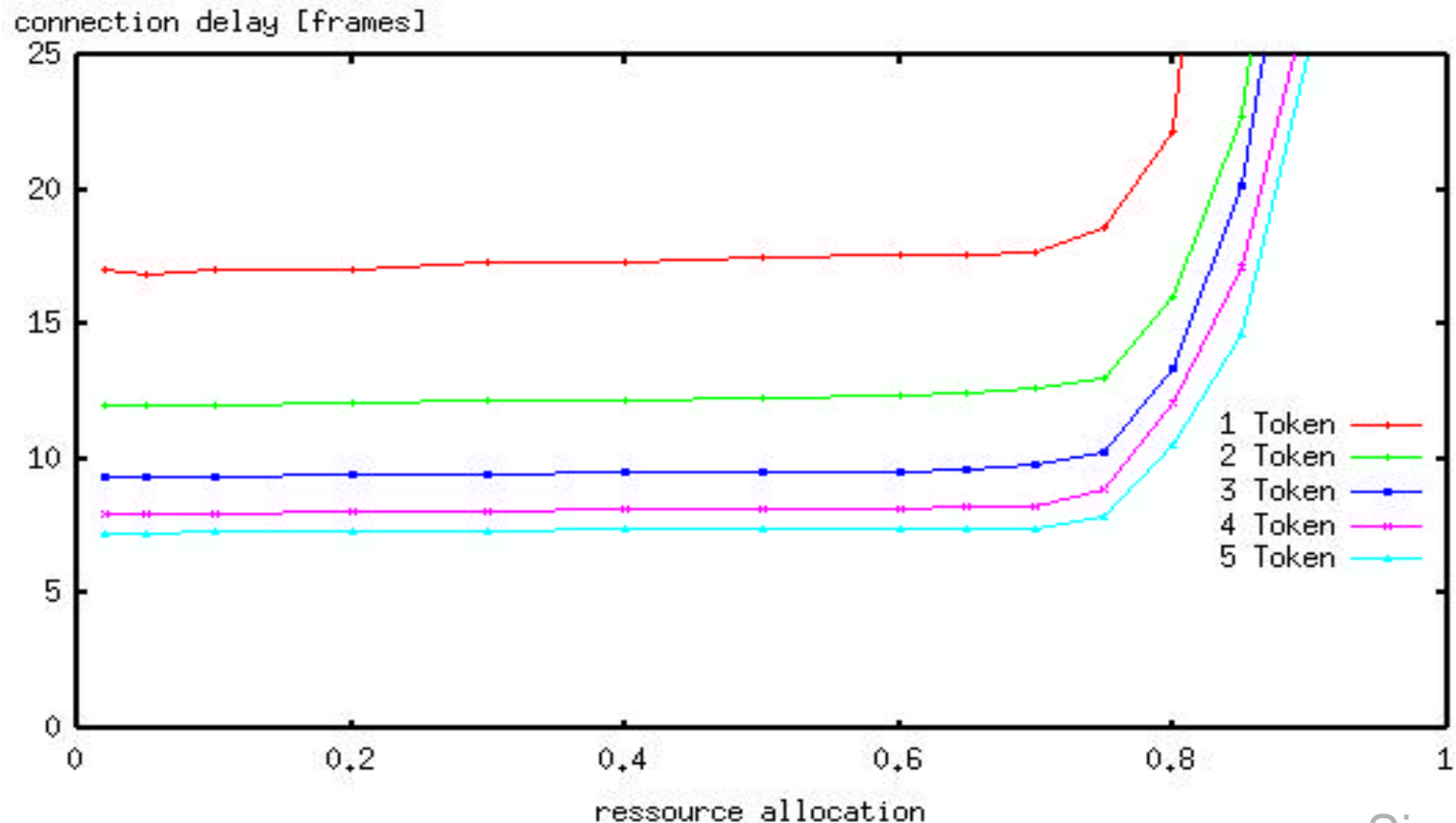
**Historically the model assumed that tokens were allocated within the OC-3 payload (transmission frames of 125 ms) and that token passing or token message passing could only occur in the next OC-3 payload.**

**The time unit is therefore given in frames (i.e. in units of 125 ms).**



# Delay of connection setup

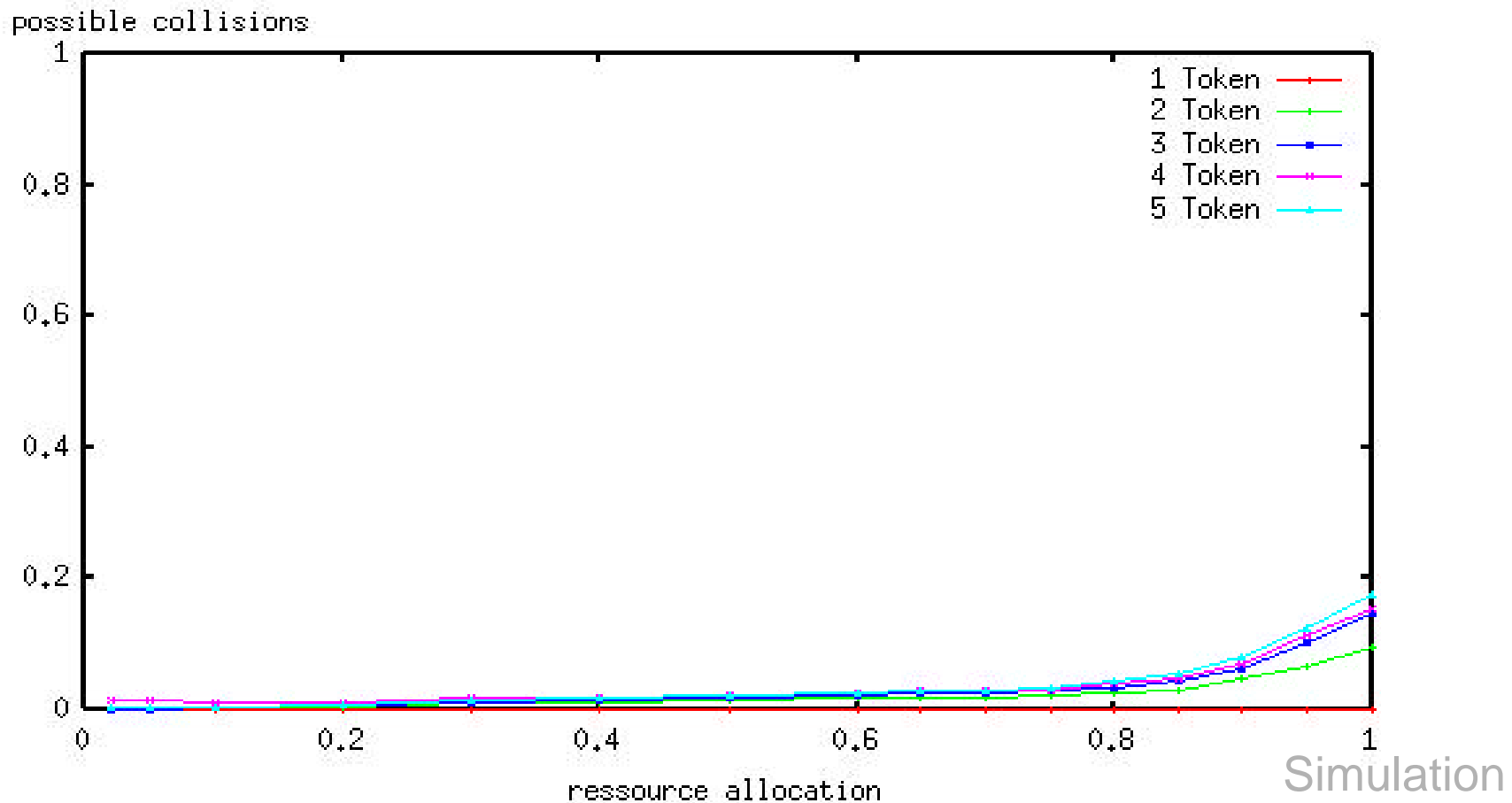
- With a higher number of tokens the connection setup delay reduces because a token gets available earlier



Simulation

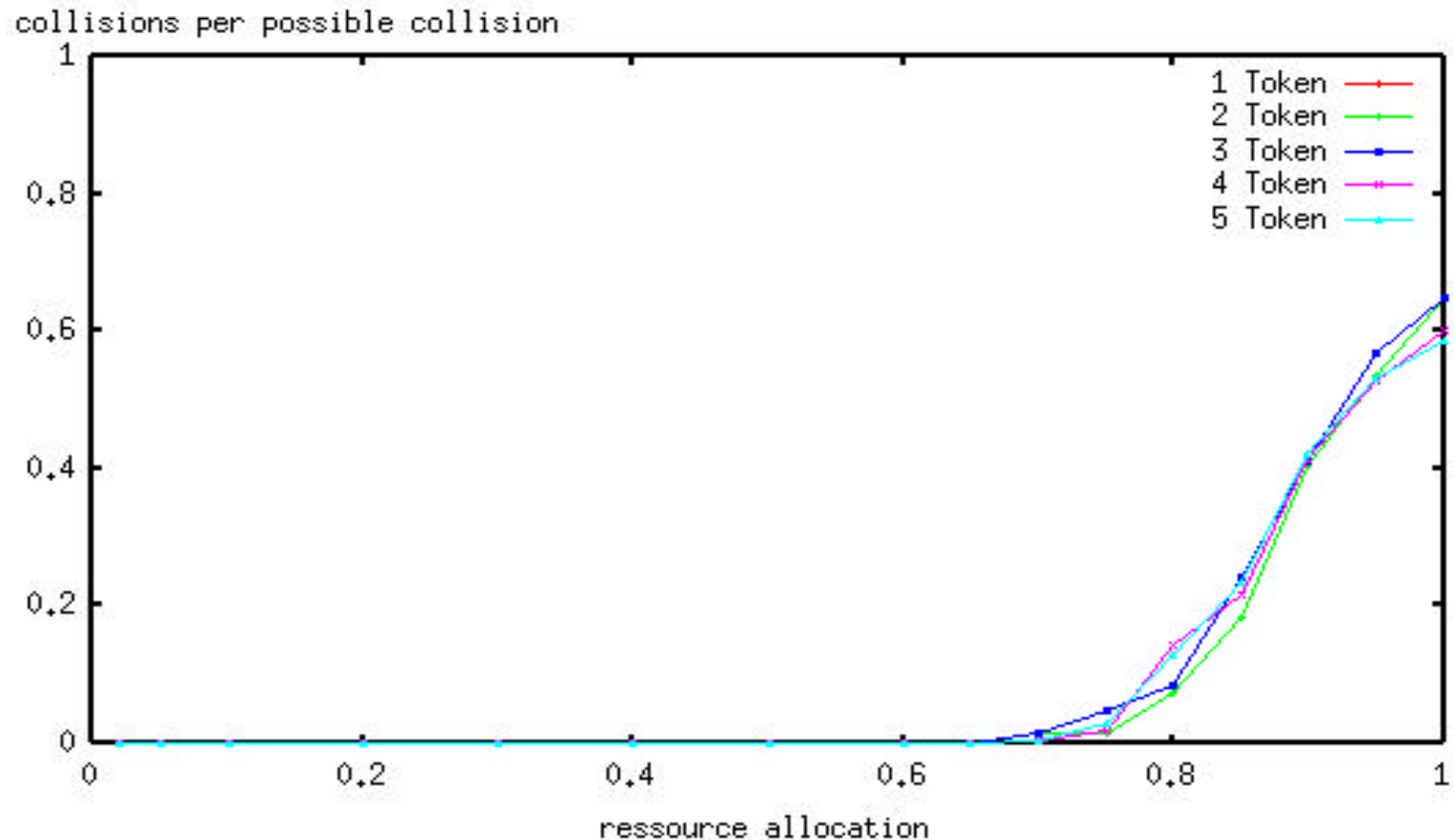
# Portion of potential collisions

- The portion of possible collisions increases with higher resource allocation on the ring



# Portion of real collisions

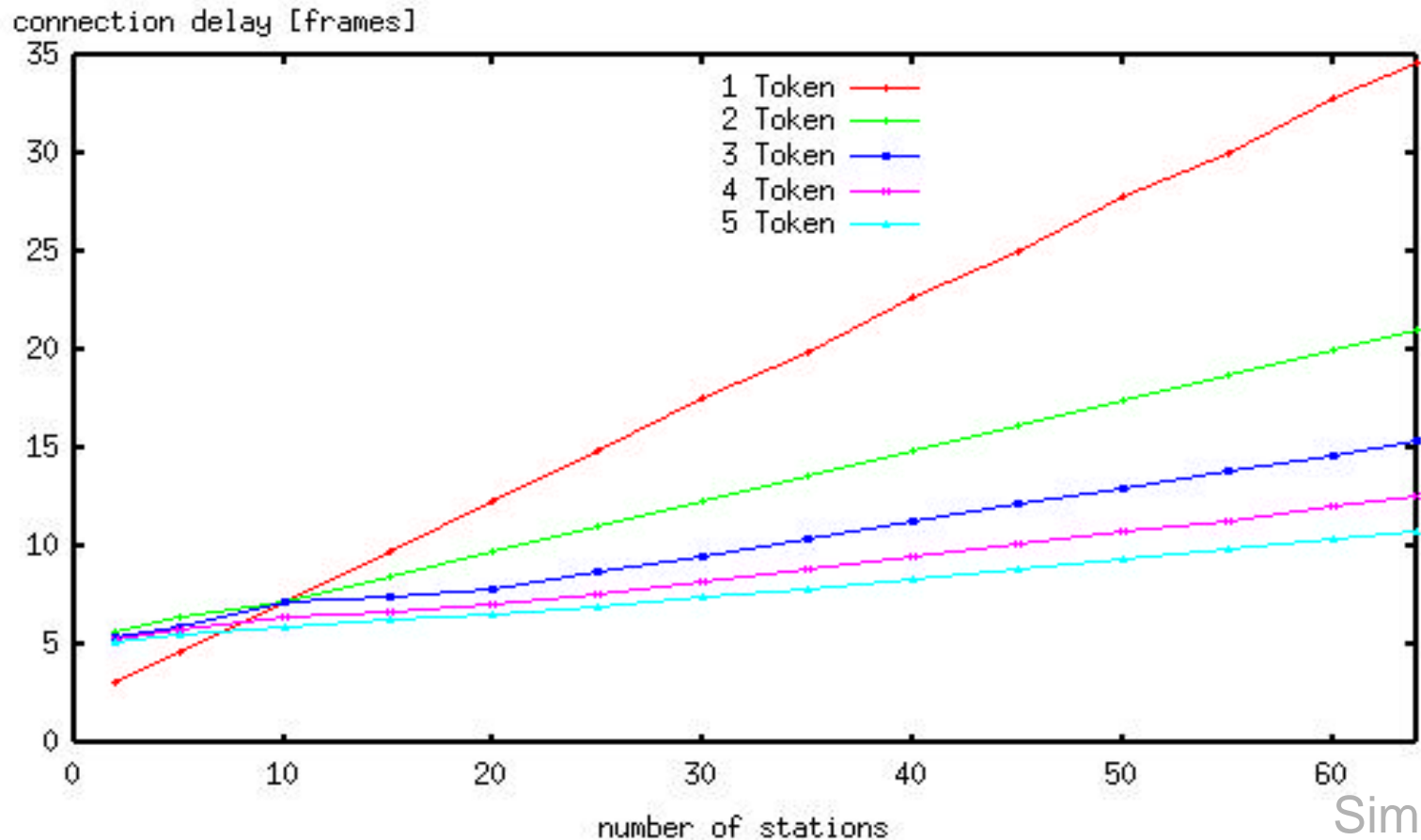
- Collisions only occur at high resource allocation on the ring



Simulation

# Varying the number of nodes

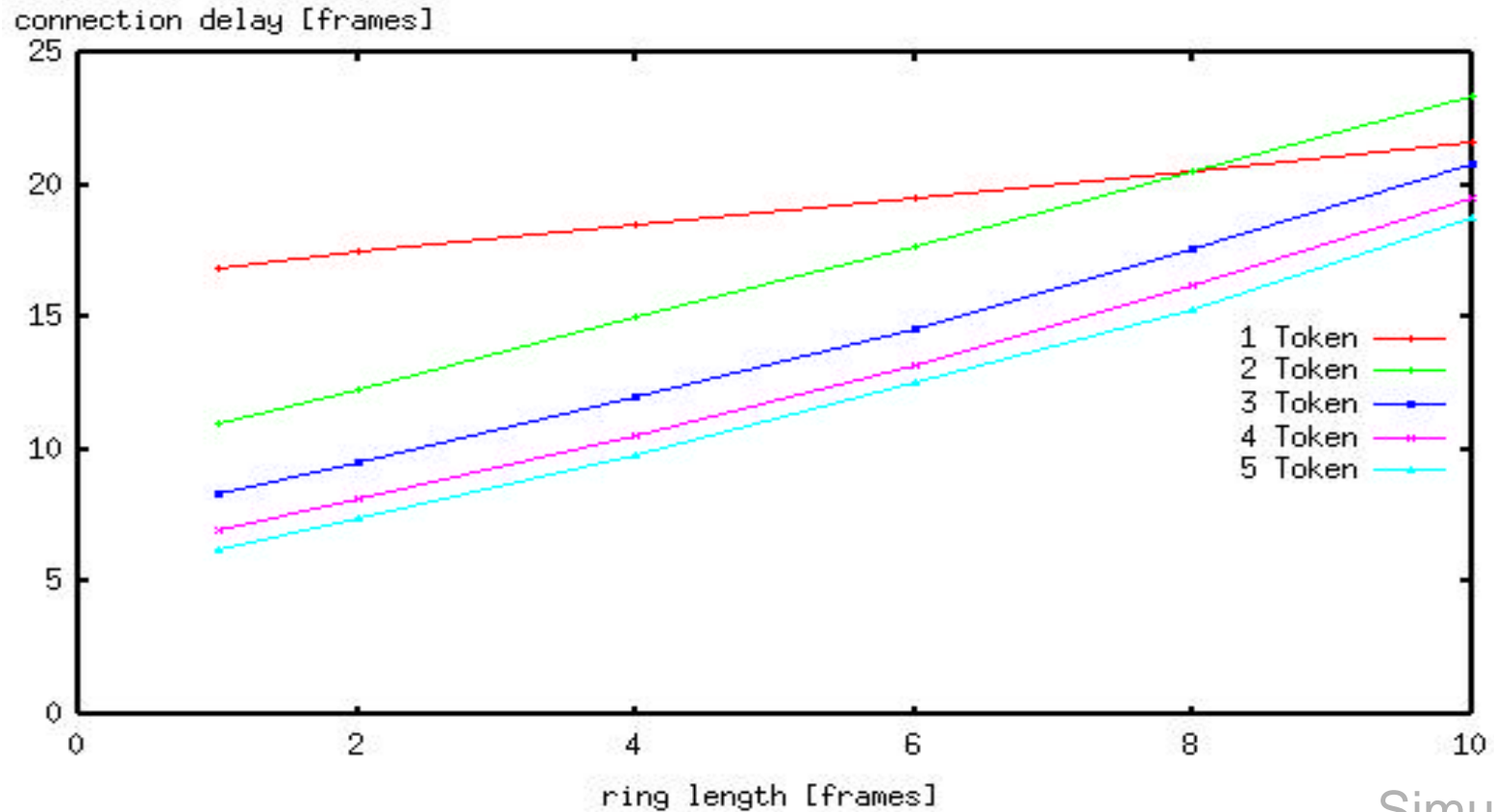
- With a higher number of nodes, the reduction in waiting time for a token becomes larger



Simulation

# Varying the ring length

- The ring length has a double effect on the connection setup delay when using more than one token because of the critical time one has to wait in this case



Simulation

# High traffic dynamics

- At high traffic dynamics (many connection setups and releases) the advantages of the token signalling protocol becomes apparent
- Main advantage of the multiple tokens: parallel handling of connection requests

