Simulation Model of the Intelligent Network's Node

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Introduction

Goal:

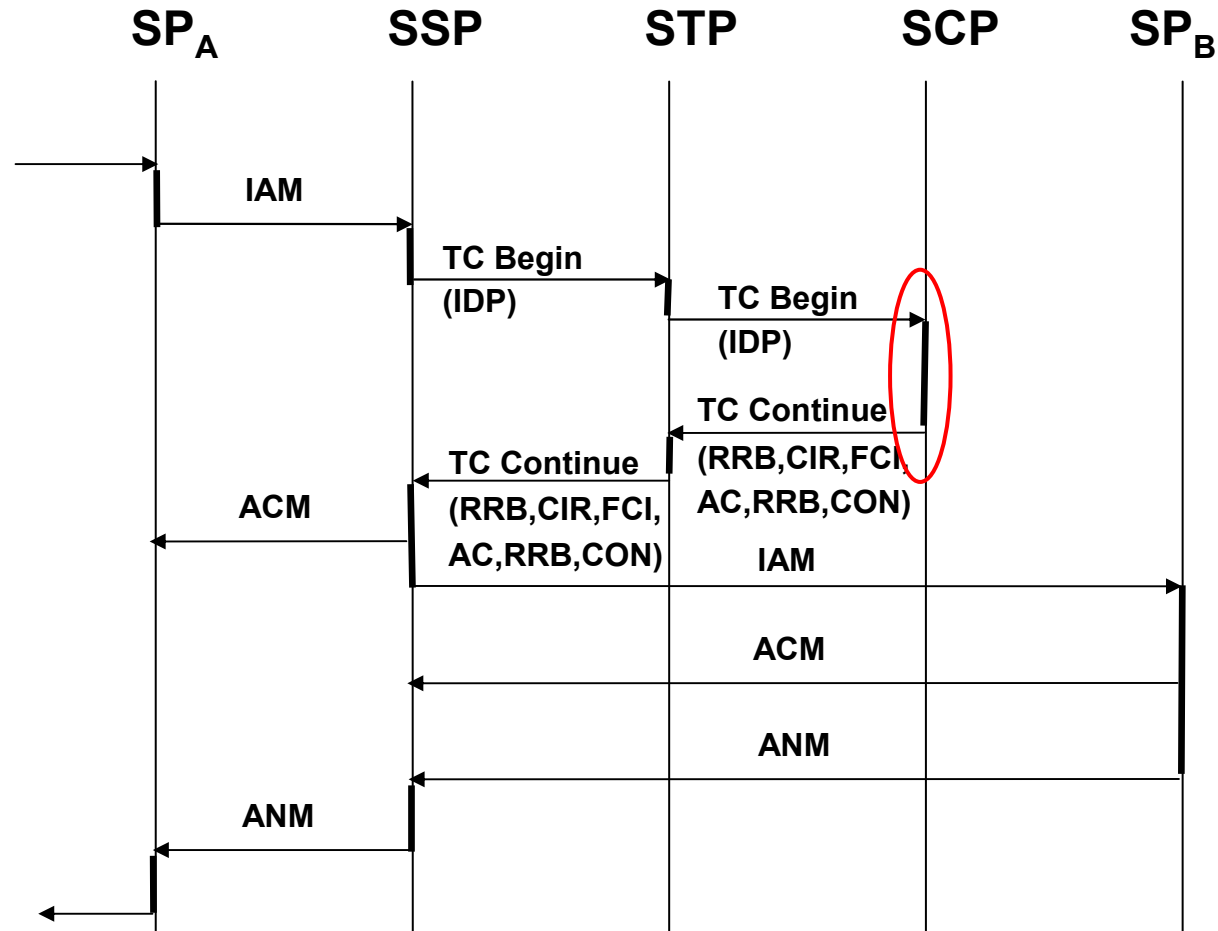- calculate delays which occur during call establishment process for IN services

Tasks:

- create simulation model of message-processing in IN nodes
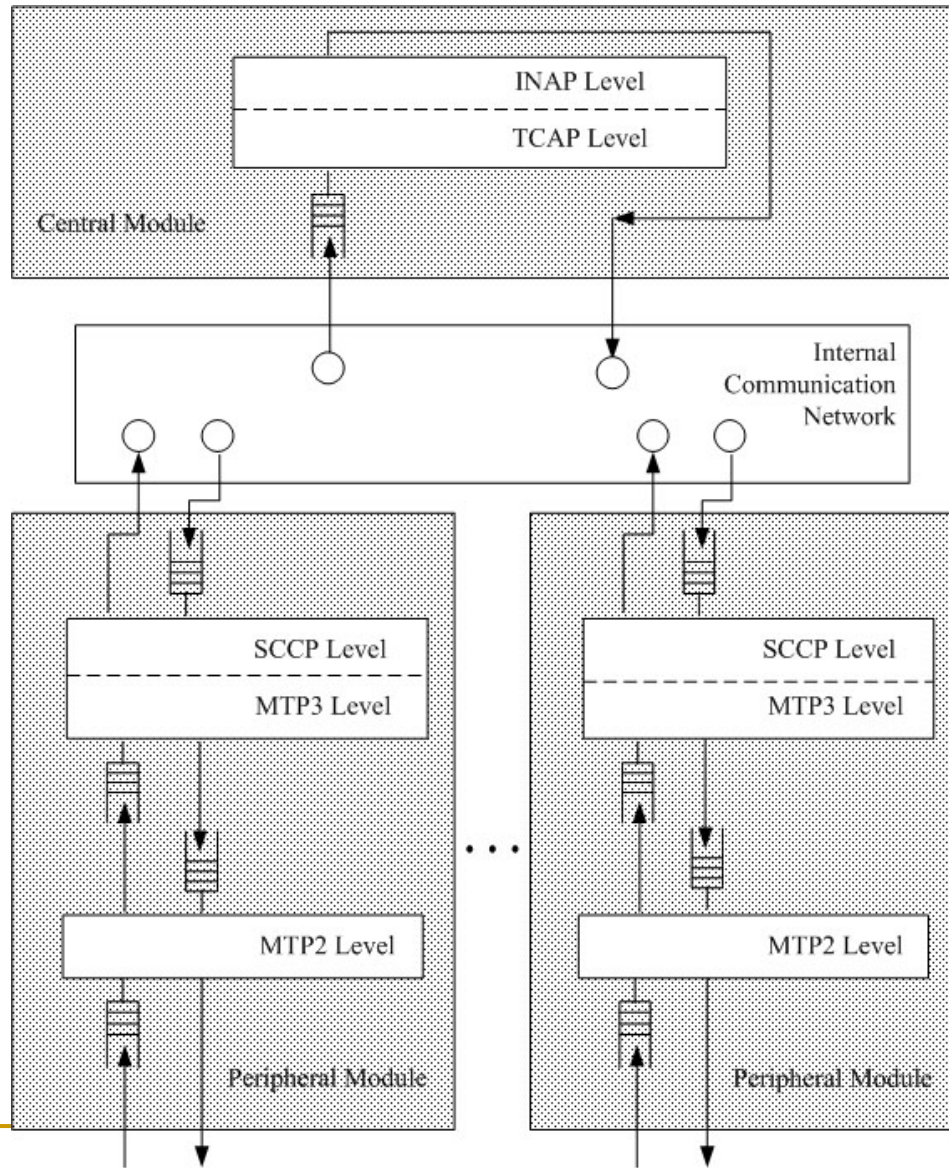- compare analytical and simulation results

Simulation environment: GPSS World Student Version

IN Call establishment process
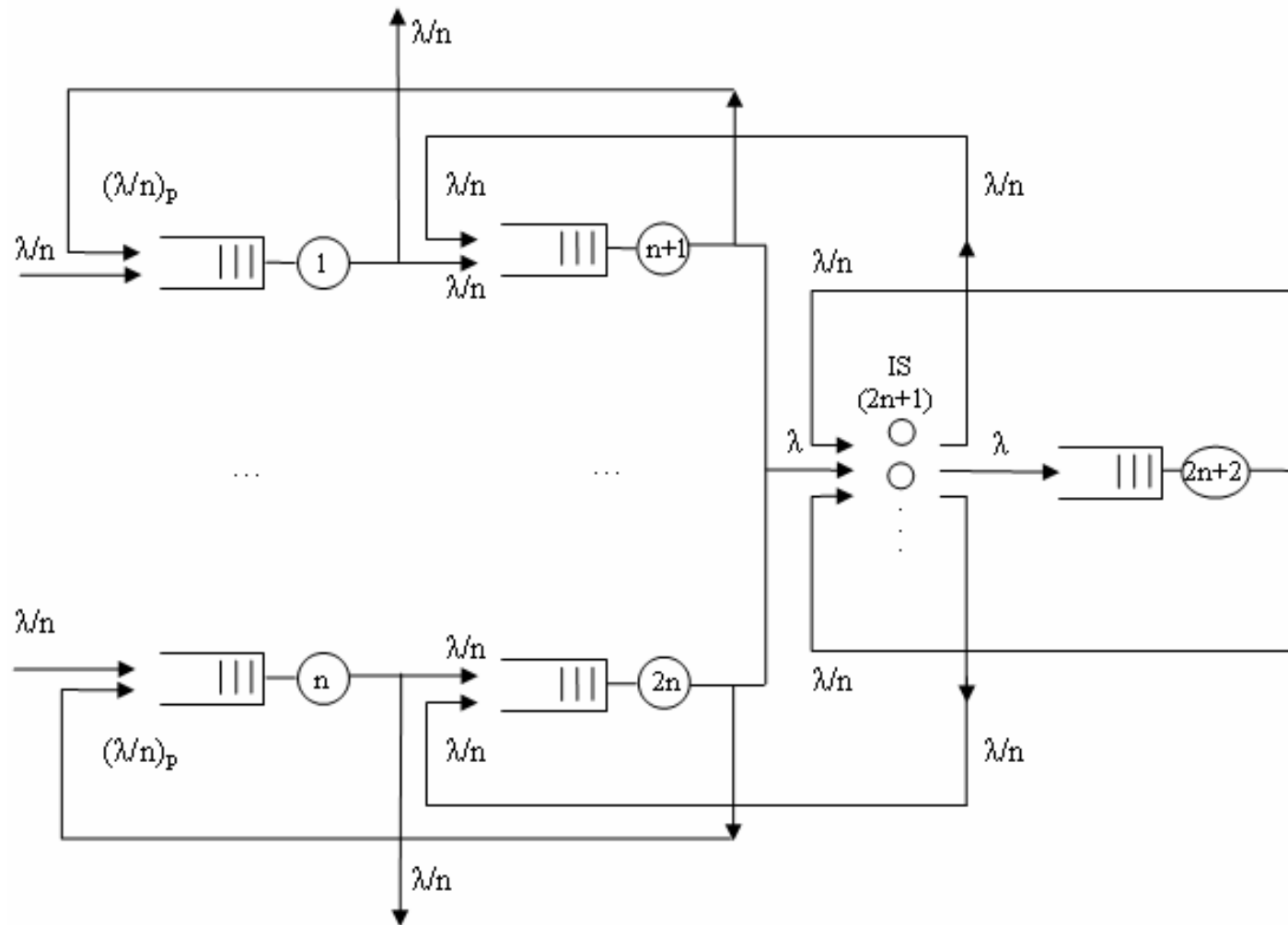
Functional model of IN node

ISM - Invocation state machine
CC - Component coordinator
DH - Dialogue handling
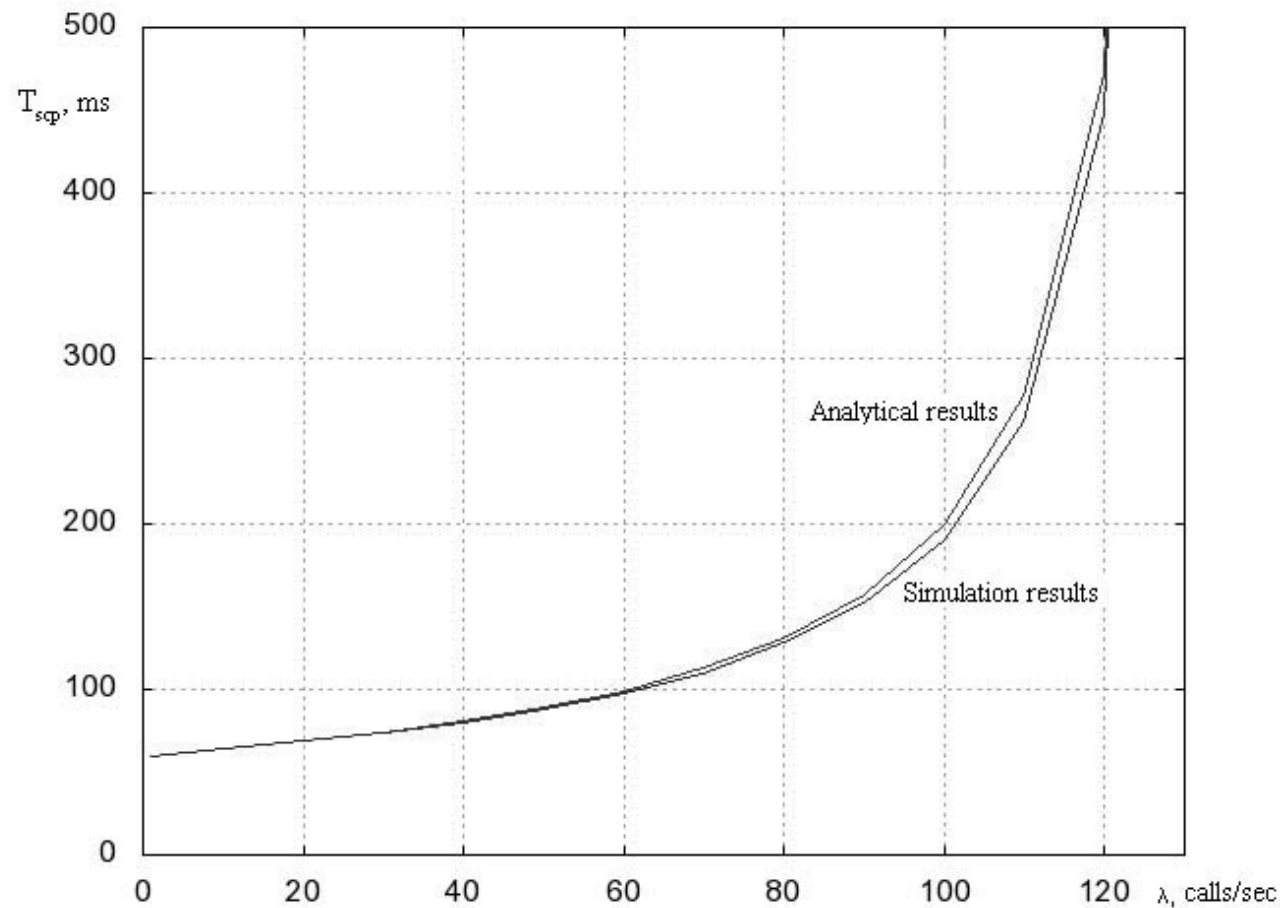TSL - Transaction sub-layer

CL - Connectionless transfer control
RT - Routing control

RT – Message routing
DC – Message discrimination
DT – Message distribution

Open queuing network (IN node)

Mean time for processing of signaling message in IN node

Absolute/relative errors

λ, calls/sec	T_{SCP}, sec (analytical)	T_{SCP}, c (simulation	Absolute errors (α)	Relative errors (δ)
1	0,060	0,060	0	0
10	0,064	0,064	0	0
20	0,069	0,069	0	0
30	0,074	0,074	0	0
40	0,081	0,080	0,001	0,01
50	0,089	0,088	0,001	0,01
60	0,099	0,098	0,001	0,01
70	0,113	0,110	0,003	0,02
80	0,131	0,128	0,003	0,02
90	0,157	0,152	0,005	0,04
100	0,200	0,191	0,009	0,04
110	0,277	0,262	0,015	0,06
120	0,471	0,448	0,023	0,05
130	1,822	1,753	0,069	0,04

Conclusion

- Analytical results – upper threshold for signaling message processing time

- relative errors do not exceed 5%

  (max arrival rate – 100 calls/sec)

- Mean delay value in the SCP node

  → 60 - 200 ms

- Mean call-processing time in IN node for busy hour (10 calls/sec), IN Service – Universal Access Number

  → 64 ms

Thank you!