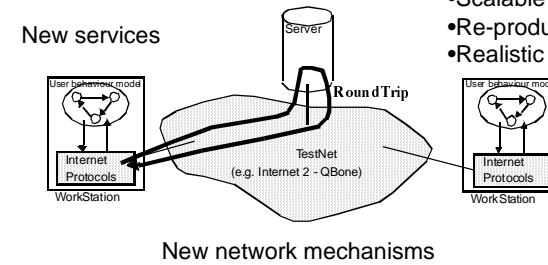


## GenSyn – Java-based generator of synthetic Internet traffic

Poul E. Heegaard, SINTEF Tele & Data (now Telenor FoU)  
 Manyi Lu, SINTEF Tele & Data (now Clustra)

## The need of a traffic generator

- Controllable
- Scalable
- Re-producible
- Realistic traffic



## Why traffic modelling?

- Evaluation of the performance of new network mechanisms & end-user applications
  - Simulation studies
  - Controllable & reproducible measurements

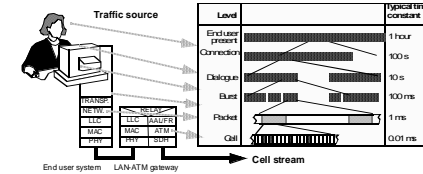
## Traffic generation

- Replay of recorded stream of IP packets
- Worse case generation (“full speed”)
- Black box: Stochastic model of aggregated stream
- White box: Physically based source models

## Modelling approaches

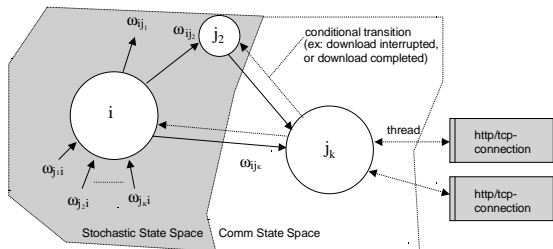
- Black box approach
  - stochastic process fit measurement trace
- White box approach
  - physically interpretable
    - end-user behaviour
    - application & network mechanisms
    - equipment & protocols
  - traffic mixture fit measurement trace

## Framework for source modelling



- Different activity levels
- Stochastic model
- Communication model
- Source composition

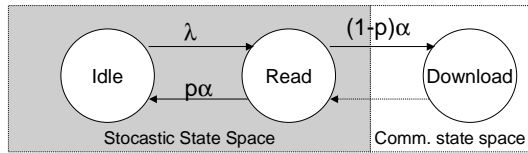
## Framework for source modelling – stochastic and comm. state space



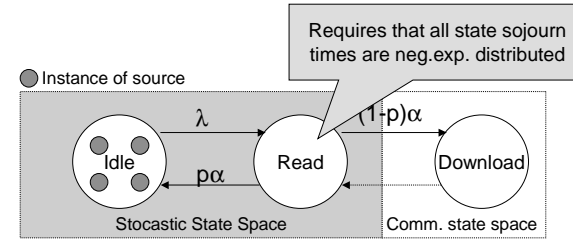
## Example – Web source

- Overall model
- Measurements -> define parameters
- Fit parameters to heavy-tailed distribution
- Model of web-browser client
- Server not a model – a real server

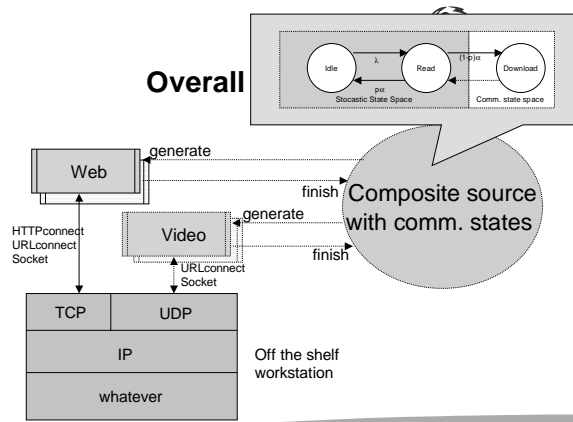
### Example – Web source



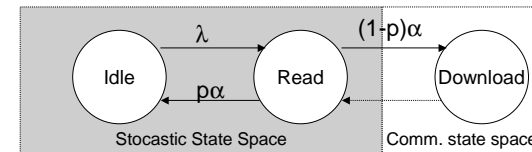
### Composition of users

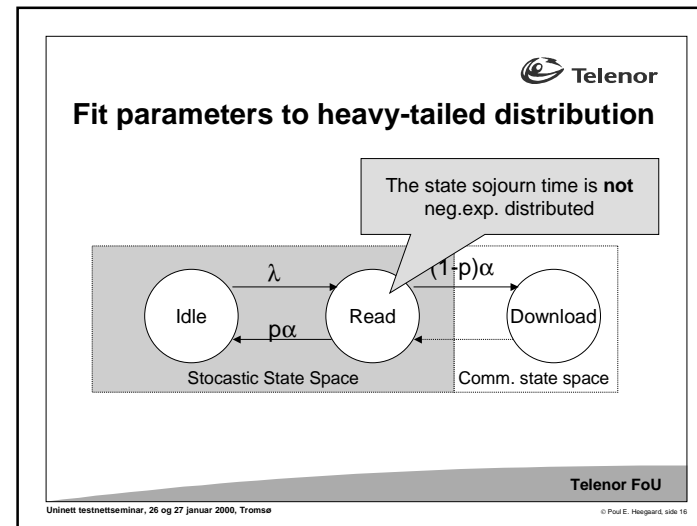
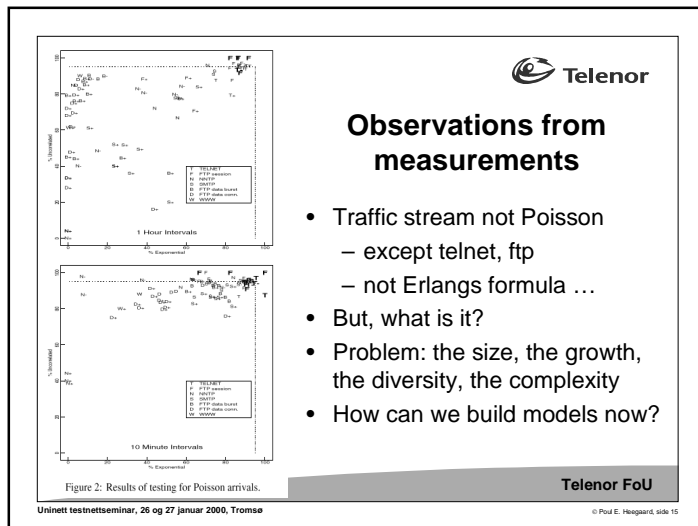
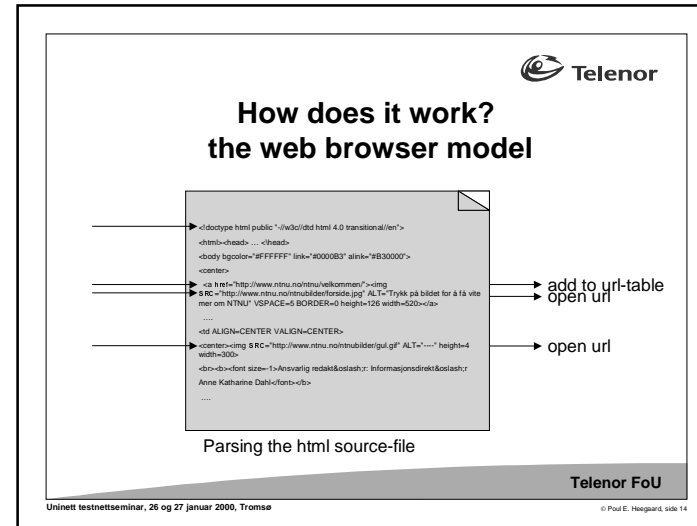
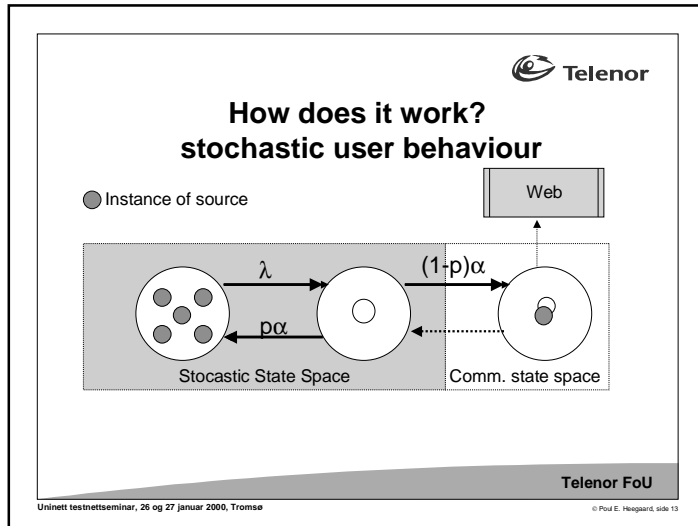


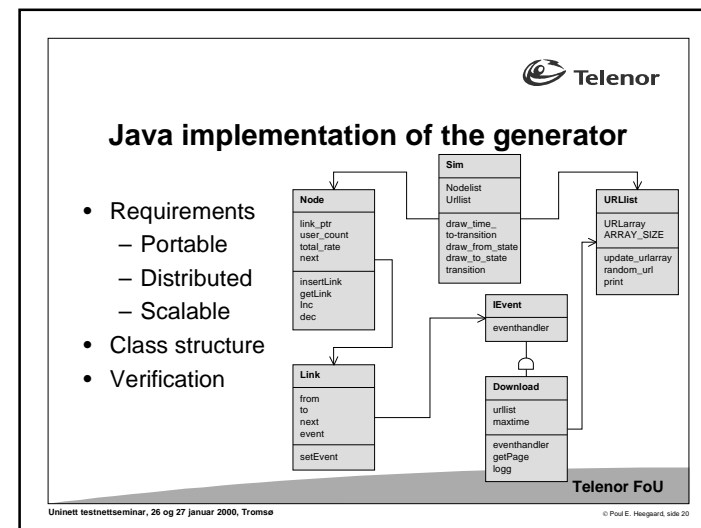
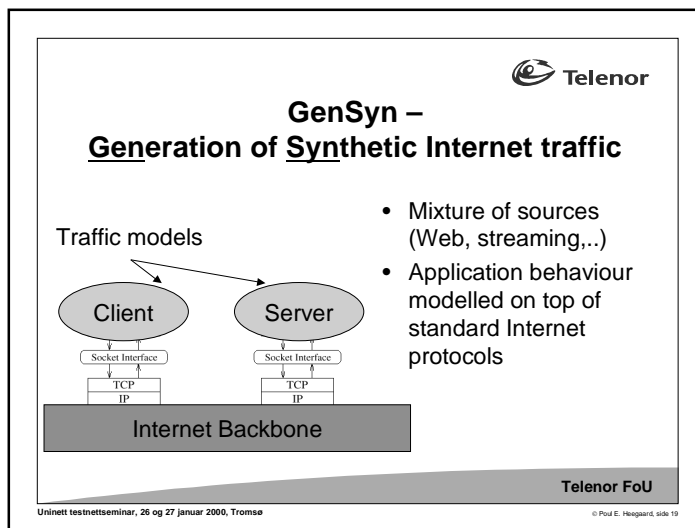
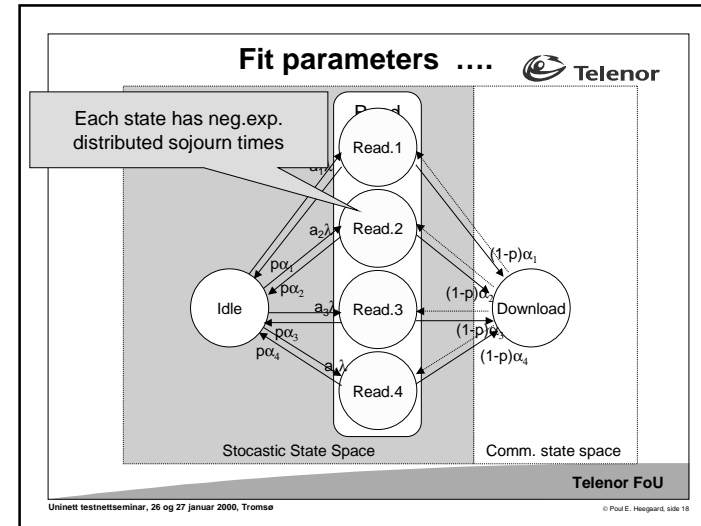
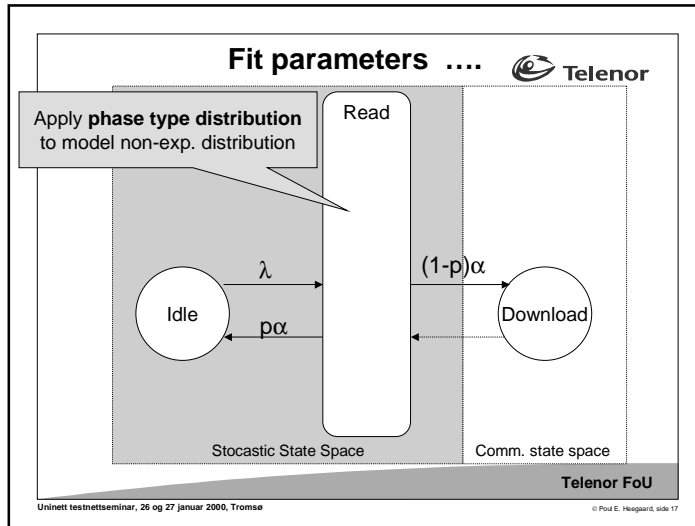
### Overall




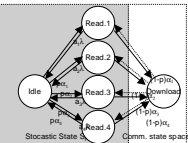
### How does it work?












## Verification

	Idle	Read.1	Read.2	Read.3	Read.4	Download
Exact	137.28	20.56	59.93	24.00	53.57	4.67
DEMOS	136.62	20.79	60.44	31.72	45.89	4.54
NT*	121.17	27.93	62.83	28.92	58.11	5.71
UNIX*	128.37	22.77	61.85	24.56	58.17	5.02

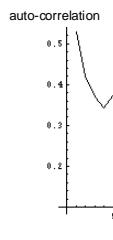
\* Without physical downloads (stochastic duration)

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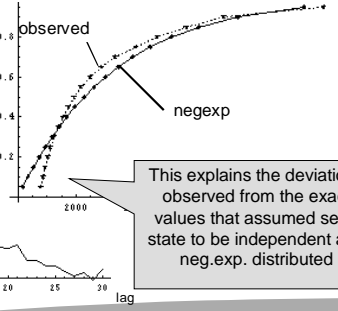
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## Physical download characteristics



auto-correlation




observed  
negexp

This explains the deviations observed from the exact values that assumed send state to be independent and neg.exp. distributed

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## Closing comments

- Critical factors
- Generator features
- Experiences

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## Further plans

- Add new comm. processes
- Add new model templates
- Make Java applet
- Convert Java implementation to c
  - Lower level comm. interaction
  - Include measurement features
  - Improve event granularity

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