TABLE I
MAPPING BETWEEN THE QUEUING NETWORK MODEL AND THE P2P VOD SYSTEM

A queuing network	A overlay
A node Q_i	A peer p_i
A job	a unit of budget
num. of jobs in a node	a peer's budget
routing probability	probability of budget transfer
num. of routing arrows ending at Q_i	num. of p_i's upstream neighbors
num. of routing arrows heading at Q_i	num. of p_i's downstream neighbors
u_i	p_i's budget average spending in a unit of time
λ_i	p_i's avarage net income of budget in a unit of time

TABLE II
NOTATIONS USED IN THE MODEL

N	num. of peers

λ_i can reflect peer i's upload capacity.

For the simplest model, with $p_{ij} = \frac{1}{N}$, is there any condensation? seems not.

Notes on April. 7

The paper "Condensation in Large Closed Jackson Networks", which gives sufficient condition of condenstion in its Theorem 2.2, seems useful.

Notes on April. 8

a BCMP network is a class of queueing network for which a product form equilibrium distribution exists. The theorem is a significant extension to a Jackson network allowing virtually arbitrary customer routing and service time distributions, subject to particular service disciplines.

The term of “a product form equilibrium distribution” seems to be similar to “factorized steady states” quoted from the paper “Factorized steady states in mass transport models on an arbitrary graph”.

The paper “Factorized steady states in mass transport models on an arbitrary graph” offers sufficient and necessary conditions for the “factorized stead states” and argues that “having a factorized steady state opens the door for the study of condensation” and “Thus one should be able to analyse condensation in various geometries or even on scale-free networks”. This tells us that even if we don’t need to use the result of this paper to get the sufficient and necessary conditions (but, instead, find out the “factorized steady state” based on the assumptions of our specific model), we have more confidence to analyse the condensation once we have the “factorized steady state”.

Because of the paper “Factorised steady states in Mass Transport Models” is based on a very constrained network (a one-dimensional lattice, namely, mass can only move from site i to site i+1, or, from site L to site 1), we can jump across it to directly read the discussion on an arbitrary graph [2006].

Notes on April 9.

Planed reading: “Complete condensation in a zero range process on scale-free networks” and “Factorized steady states in mass transport models on an arbitrary graph”