



# Hamilton Institute

## Seamless Self-Assembly of Files in Cache Networks at Minimal Storage Cost

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Thursday, March 23<sup>rd</sup>, 2006

### *Abstract*

A file  $F$  is sited at the root of a tree network of nodes, each able to cache part or all of  $F$ . Each node may also have a client wanting to download  $F$ . Links between neighbors in the tree have given transmission delays associated with them. The paradigm of seamless transmission requires that requesting nodes start receiving  $F$  immediately, receive it continuously until  $F$  is fully assembled, and be implemented by means of a protocol which is unaware of network structure beyond links to immediate neighbors. We mention similar structures appearing in a biological (molecular) counterpart known as "self-assembly," which make it natural here to adopt the term "seamless self-assembly."

Nodes where clients are located are specified as part of the problem instance. We show how to assign segments of  $F$  to the node caches in such a way that seamless self-assembly is realized and, simultaneously, the total cache size achieves a lower bound determined solely by the network link delays. Extensions of the problem in several dimensions are discussed as directions for further research.

**Venue:** Seminar Room, Hamilton Institute, Rye Hall,  
NUI Maynooth

**Time:** 1.00 - 2.00pm (followed by tea/coffee)

Travel directions are available at [www.hamilton.ie](http://www.hamilton.ie)



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