



Peer-to-peer networks exploded onto the scene around 2000. That is when Napster, LimeWire, BitTorrent, and similar services made it possible for anyone to download libraries of music and movies for free over the Internet. The new technology gutted music industry profits and led to massive layoffs and downsizing.

Yet peer-to-peer networks are not inherently bad for profits, Associate Professor Vishal Misra argued. In fact, they may prove the most efficient and least expensive way to share media over the Internet.

Back in 2000, large peer-to-peer networks were something new. Instead of warehousing information on a central computer, they took advantage of files distributed on PCs throughout the network to store and send files to other users.

“Smartphones need lots of bandwidth. Wireless providers want us to buy femtocells, small broadcast towers to improve performance in our homes and offices. Instead, they should give us femtocells. Then they could offload traffic from their cell towers and reduce the number of new towers they need to build to support their smartphones,” he said.

“Everyone agrees P2P is a great technical solution. The more users, the more resources the network provides and the faster it responds to requests,” Misra said. This is the opposite of today’s centralized client-server model, which must keep investing in more servers as network demand grows larger. “There shouldn’t be this war between P2P users and people who own music and movie copyrights on the other. We need an economic reboot so that system works for both camps.”

To understand how that might be possible, Misra used game theory to analyze the problem. Ordinarily, models that involve cooperative interactions are extremely hard to calculate, especially for millions of users. Misra simplified those calculations by applying theories based on fluid flow to the continuum of users and peers. “It’s like analyzing a glass of water as a fluid instead of trillions of water molecules. By representing millions of peers as a fluid, it is easier to see their behavior and compute the right incentives.”

For example, Misra estimates that providers of such content as live TV and video-on-demand could save over 90 percent of their Internet distribution costs through user-based P2P networks. “The stores could save lots of money, and people who own legal copies of media might be willing to share them if they receive part of those savings,” said Misra.

“Peers, or users, can help providers reduce costs, as long as incentive structure are in place to reward them,” he concluded.

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## *Boosting Profits with Peer-to-Peer Networks*

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