A model for posting and selection of videos by the users of an On-line Social Network

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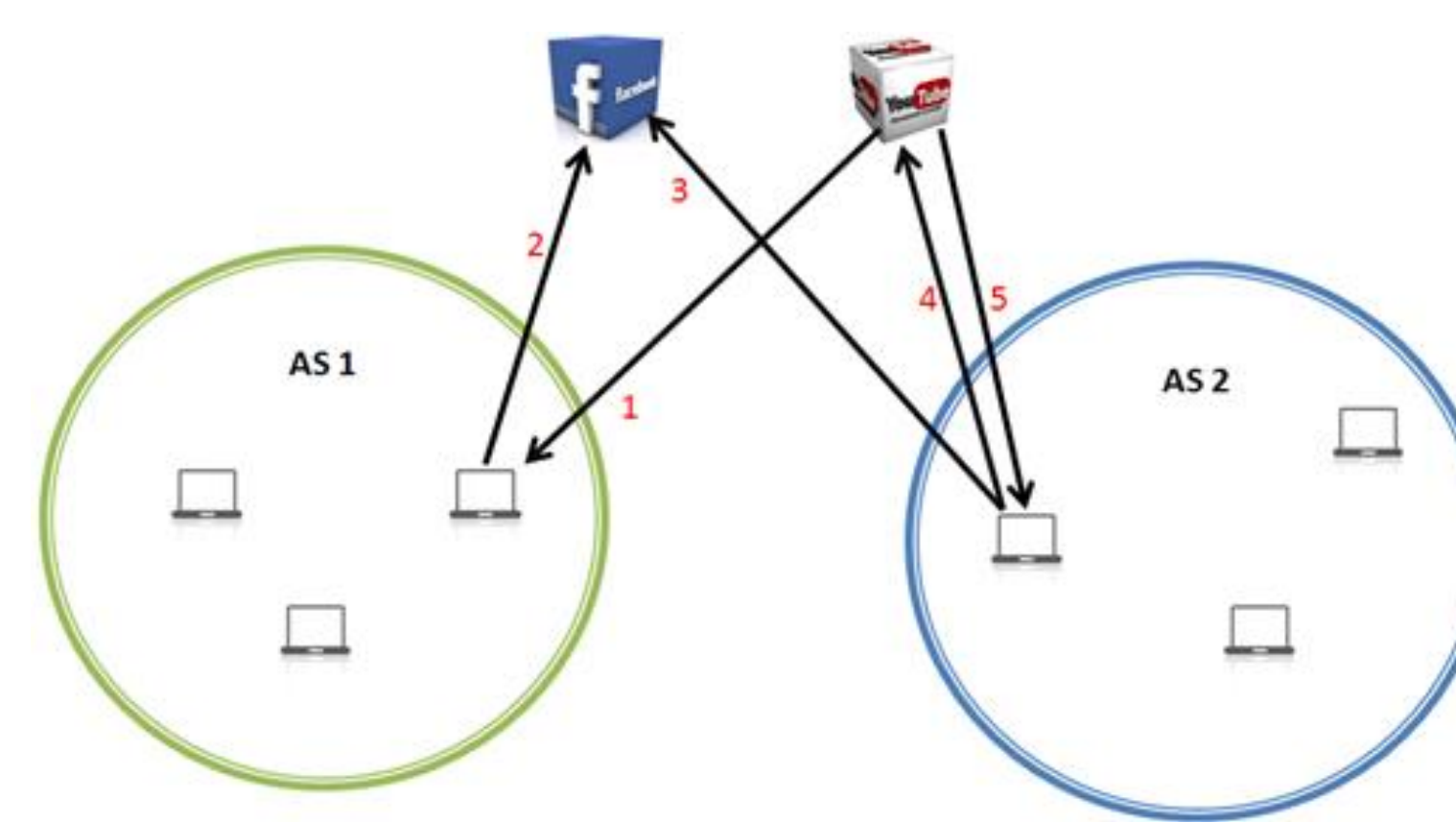**Department of Informatics, Athens University of Economics and Business, Athens, Greece**

Motivation

- **Video sharing** has been an increasingly **popular** application in Online Social Networks (**OSNs**).
- The deployment of **traditional client/server** video sharing systems in OSNs is **economically infeasible** in terms of bandwidth and also **not scalable**.
- So, we have to introduce new videos sharing system architectures and mechanisms to enhance video delivery in OSNs.
- In order to evaluate new mechanisms and architectures we have to **simulate a social environment**, thus modeling of users behavior with respect to the video demand and supply is needed.

YouTube videos on **Facebook**

1. Copy link of video from YouTube
2. Posts link of YouTube video on Facebook
3. Click on link of YouTube video on Facebook
4. Redirected to YouTube video server
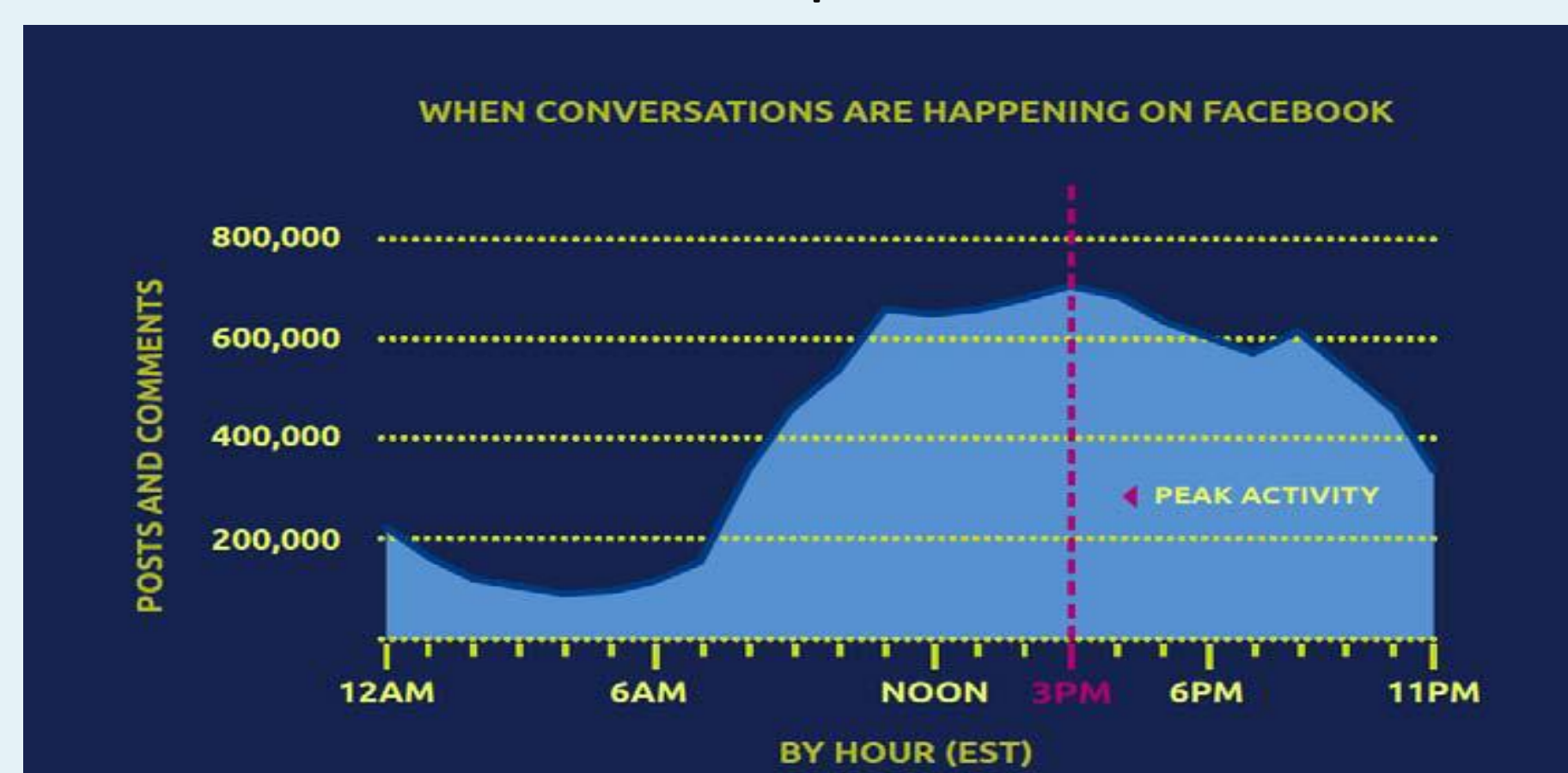5. Download video from YouTube video server

Social Observations (Case Study: Facebook and YouTube)

Viewers
- 90% viewers of a single uploader are within two social hops.
- Users have at most 4 interests and tends to watch videos of their interest.
- **Categorize the viewers of an uploader:** at least one common interest
  - ✓ **Followers:** watch almost all the videos of the user (over 80%)
  - ✓ **Non-followers:** watch videos less than a high threshold (80%) and more than a low threshold (30%) of the user
  - ✓ **Other viewers:** watch videos less than the low threshold (30%)
- Followers driven by social relationships, while non-followers are driven mainly by interest.
- 16% of 1-hop friends watch each given post of a user

Online Time
- 50% of OSN users are **daily active users**, spending on the average **20min** online.
- Users spend on the average 140min daily on the Internet
- Interaction in Facebook peaks around 3PM

Videos on Facebook
- One link shared every 15 Facebook users everyday (most of them videos >50%)
- 86% of videos in Facebook are from external links (80% of them from YouTube), 14% are Facebook videos
- Facebook drives 11.8% of all referred video traffic
- YouTube videos' popularity follows Power Law distribution
- Average length of a YouTube video is ~4 minutes

Simulation Model

19 interest categories: based on YouTube video categories

Time
- Divide time in 20min-slots (average daily time on Facebook)
- Divide each 20min-slot in five 4min-slots (average length of a video)
- Each users activity (post or view) can occur in different 4min-slot

Users
- 50% users daily active, exact level of activity for each user depends on his number of friends
- 20min daily active on Facebook
- 140min daily active on the Internet
- 4 interest categories: weighted random choice, weights are % of category in YouTube

Video Generation (Pool of videos)
- Popularity: Power Law distribution
- Interest category: weighted random choice
- Average length 4 minutes

Potential Viewers
- To achieve an average 16% of friends as viewers of single post, we set potential viewers at 1-hop 38%.
- Each video mostly watched by the followers of the uploader, less by non-followers and rare by other viewers.

Video demand
- Each user watches randomly [1, 5] videos (20min online)
- Each user can have access to all videos shared by his 1-hop friends
- Each user watches videos only on his 4 interests
- Videos belonging to user's top interests are more likely to watch
- Videos with higher popularity are more likely to watch
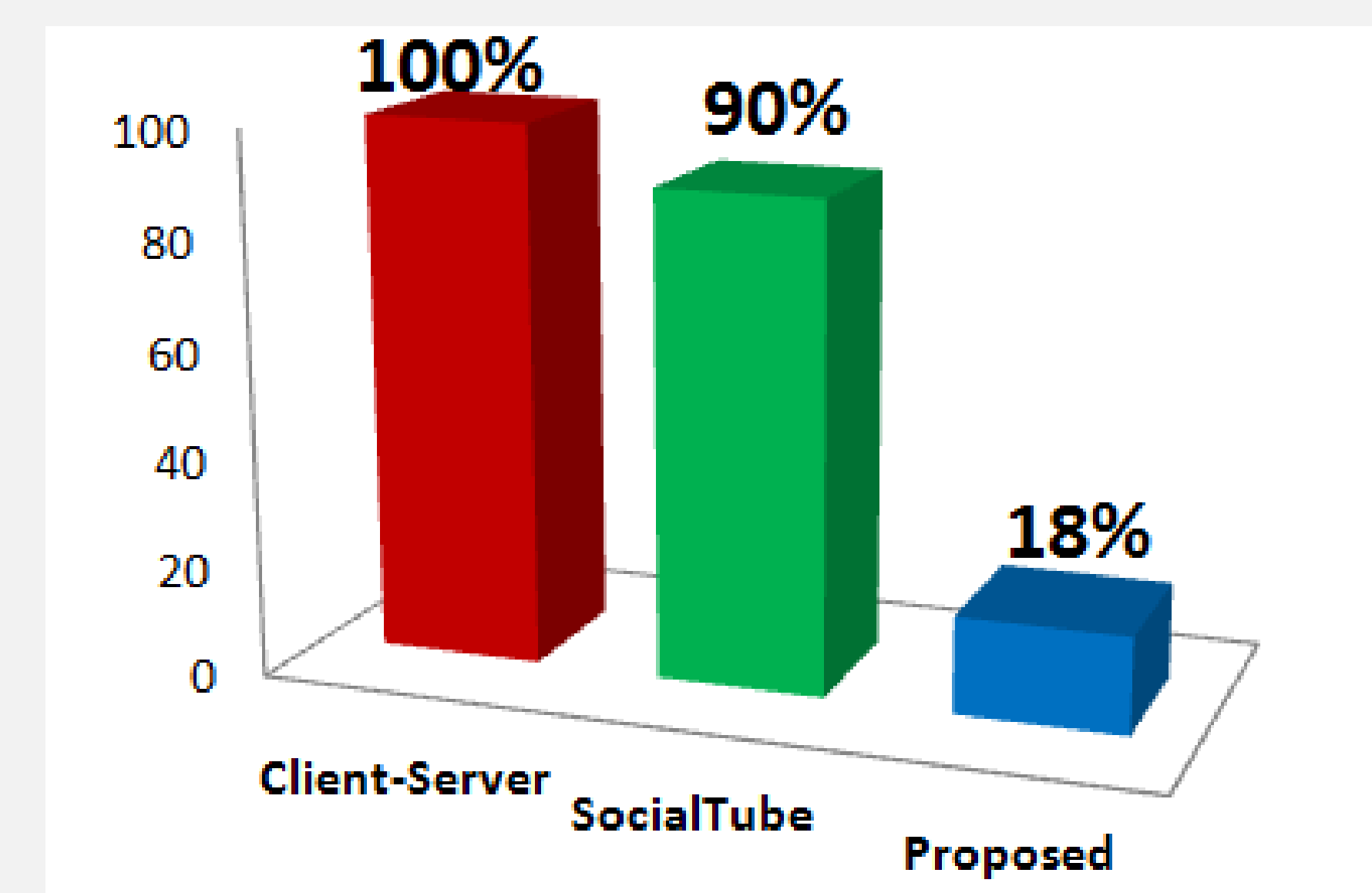
Video supply
- 1 video for every ~20 users uploaded every day
- Videos can be uploaded only by users are active the current 20min-slot
- A user can upload more than one videos in the current 20min-slot
- With probability 11,8% a video is a share from a friend, while with 88,2% it is a new upload
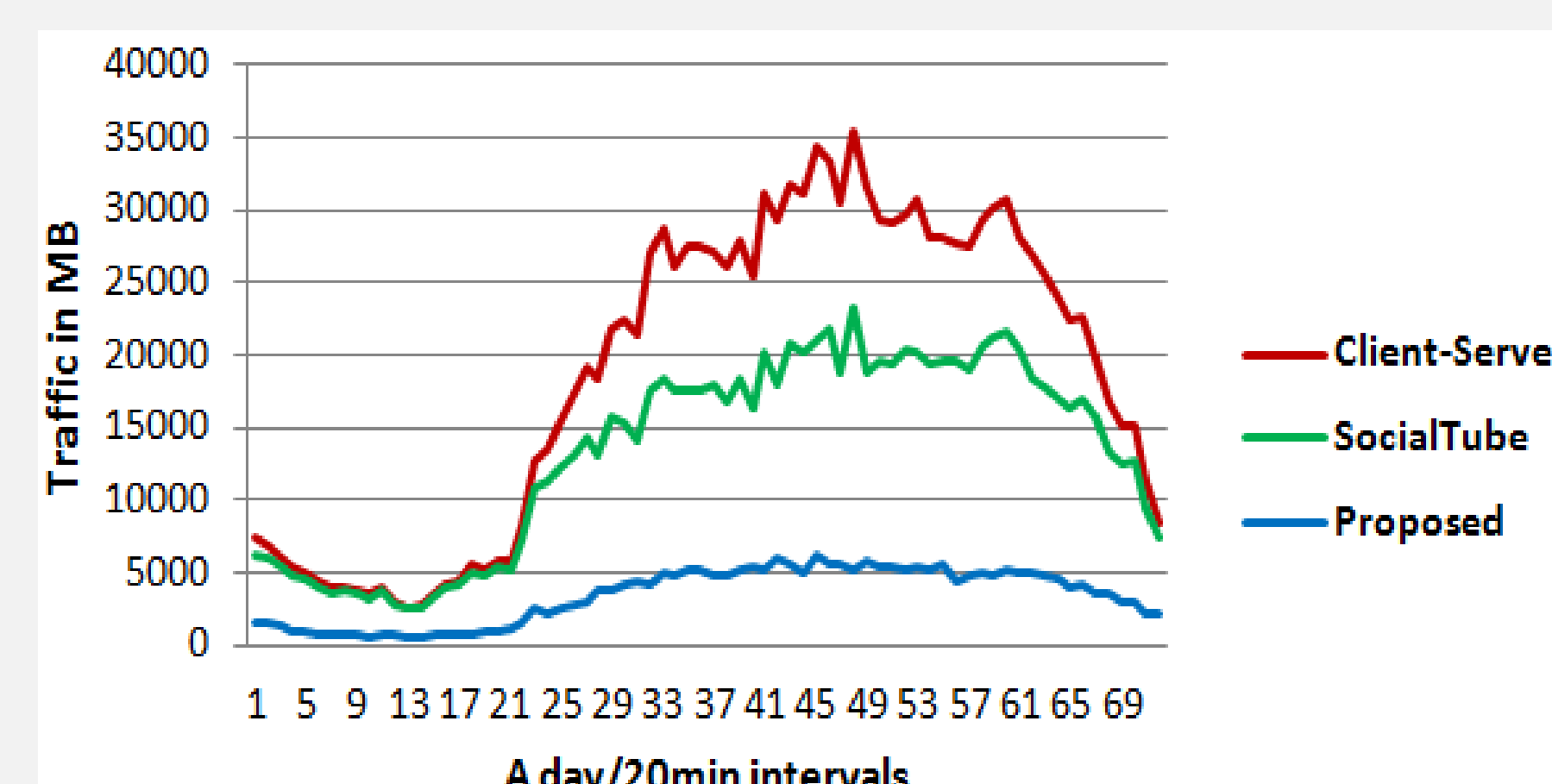
Simulation Metrics
- Inter/Intra AS traffic
- Contribution of server hosting the video
- Redundant traffic

Simulation Results

This simulation model has been successfully used for the evaluation of mechanisms promising efficient video delivery, while exploiting information extracted from OSNs.

Total inter-AS traffic

Contribution of external server