MULTIMEDIA AND APPLICATIONS

1. Descriptive title: Measurement-based study of Twitter as a second screen
Goal: Develop a measurement methodology, collect datasets, and perform a preliminary analysis
Requirements: Will work with one or more APIs (including the Twitter API) to collect data about how Twitter is used as a second screen to discuss ongoing live events or TV shows. Using twitter data from live events or popular TV shows, this project should look closer on how similar/different opinions during such events can bias the "friend network" (e.g., the people a user follows and the amount of re-tweets that the user does of tweets by this person).

2. Descriptive title: Personalized second screen during live events
Goal: Develop a twitter-based news aggregator that collects information about live events (e.g., a soccer/hockey game or an ongoing TV show) and then present a filtered information stream and personalized second-screen viewing experience.
Requirements: Will work with one or more APIs (including the Twitter API). Ideally, this work should include the use of sentiment analysis and "semantic memory".

VIDEO STEAMING, LTE AND ENERGY EFFICIENCY

~~**3. Descriptive title: Reverse engineer YouTube's adaptive playback algorithm for HTTP-based Adaptive Streaming (HAS)**~~
~~Tasks: Instrumentation, measurements, and recreation of YouTube's adaption algorithm. This work will require a combination of detective work (collecting and analyzing traces) and a careful methodology to substantiate the claims regarding the operation of the algorithm.~~
~~Requirements: Access to a machine (e.g., laptop) with root access is also helpful, such as to allow various measurement (e.g., bro) and network manipulating tools (e.g., dummynet) to be used.~~

4. Descriptive title: Energy saving opportunities in LTE when watching HTTP-based Adaptive Streaming (HAS)
Goal: Investigate the potential energy savings *at the client* in LTE when using HAS.
Steps: (i) Perform a literature survey of the energy saving mechanism available in LTE Advanced (4G) that result in a model framework of the mechanisms (including energy levels, timing information, etc.). (ii) Implement a simple simulator that simulates a HAS player and the energy savings that on-off periods in HAS may allow an LTE advanced. Ideally, the simulator should be trace driven, so that traces from a regular layer could be used, for example. (iii) A preliminary simulation evaluation.

5. Descriptive title: Energy saving opportunities in 802.11 when watching HTTP-based Adaptive Streaming (HAS)
Goal: Same as for the LTE-based project above (#4), but instead focus on 802.11's power save mode (PSM) algorithm.

6. Descriptive title: Client-side energy saving opportunities in multicast using eMBMS
Steps: (i) Perform a literature survey of the energy saving mechanism available in LTE-based eMBMS that should result in a model framework of the mechanisms (including energy levels, timing information, etc.) available with LTE-based eMBMS. (ii) Implement a simple simulator that simulates

a chunk-based multicast, and the energy savings that may be possible with different degrees of burstiness in the transmissions. (iii) A preliminary simulation evaluation.

On reading list: D. Lecompte and F. Gabin, "Evolved multimedia broadcast/multicast service (eMBMS) in LTE-advanced: overview and Rel-11 enhancements", IEEE Communications Magazine, Vol. 50, Iss. 11, Nov. 2012, pp. 68--74.

MOBILE WEB

7. Descriptive title: Characterize web server access patterns (with focus on mobile users) through analysis of server logs

Tasks: (i) Characterize modern web server access patterns following existing methodology, (ii) extract mobile web accesses, (iii) compare and contrast modern mobile web access patterns with non-mobile access patterns, as well as that observed in (older) prior works.

On reading list: M. Arlitt, and C. Williamson. "Web server workload characterization: The search for invariants", Proc. ACM SIGMETRICS, 1996, pp. 126--137.

8. Descriptive title: Characterizing mobile web adaption

Tasks: The project would follow a combination of methodologies to collect measurement data for popular websites. The goals would be to (i) carefully implement a measurement methodology, (ii) perform data collection, and (iii) present a preliminary analysis.

Requirements: Access to a machine (e.g., laptop) with root access is helpful, such as to allow various measurement tools (e.g., bro) to be used.

On reading list: M. Butkiewicz, H. Madhyastha, V. Sekar, "Understanding Website Complexity: Measurements, Metrics, and Implications", Proc. IMC, 2011, pp. 313--328.

FUNDAMENTAL PROPERTIES/CHARACTERISTICS

9. Descriptive title: Comparing tails: Identification and collection of long tail datasets

Goal: Create a repository of uniformly formatted datasets with potential long-tail properties. This would include a combination of identification of public distribution-related datasets (with different forms of network related data), but could also include collection or creation of additional datasets (e.g., by extracting the distribution data from other sources). All files should follow a uniform row-column format, and a high level analysis that compare and contrast the datasets should be performed.

A quick read: A. Mahanti, N. Carlsson, A. Mahanti, M. Arlitt, and C. Williamson, "A Tale of the Tails: Power-laws in Internet Measurements", IEEE Network, Vol. 27, No. 1, Jan/Feb. 2013, pp. 59--64.