



Report on

**“Key Transformations
over the Next 10 Years”**

Breakout Sessions

**CFP All-Members’ Meeting
October 24, 2011, Santa Clara, CA**

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At the CFP Plenary meeting held October 24-25, 2011 in Santa Clara, CA, there were three breakout discussions. The topics of these were: 1) The Limits of Traffic Management, 2) Business Models for Privacy, and 3) The Evolution of Media Content Business Models: Netflix and Ultraviolet Examples. For each of these, we briefly summarize here the key points of the discussion and then reflect on how the ideas from these sessions relate to the current work of the CFP. For more detail on the individual breakout discussions see: <http://cfp.mit.edu/events/11Oct/Oct2011VideoSlidesNotes.shtml>.

The Limits of Traffic Management

MIT coordinators: Dave Clark, Bill Lehr

Summary

This discussion concentrated on the nature and balance of network traffic. It began with a proposition by Dave Clark that “data consumption rates are increasing faster than Moore’s Law.” A number of challenges that derive from this were identified, that can be divided into technical and business challenges.

Technical problems identified include:

- Traffic: Content traffic growth (especially video) is putting increasing strains on infrastructure. For example, European consumers are consuming primarily content from the US, which puts increasingly expensive demands on the infrastructure.
- Routers: Routers to support the increasing levels of traffic are becoming increasingly large and hence are expensive, difficult to design and build, and power hungry. At the same time the growth in the size of routers is slower than the traffic demand.
- CDNs: CDNs are based on peer-to-peer relationships, but as the systems evolved does it continue to be feasible to determine adequate sources of content within the CDNs?
- Technically, how does one mesh wired and wireless networks in a regimen where typically wireless is about 5 years behind wired in terms of capacity/capabilities?

The business challenges include:

- Value: participants noted challenges in understanding the value of several aspects of the environment and to whom: caching, bandwidth, the various elements of a link, middle-link/backbone vs. last mile.
- Economic or business tradeoffs: Questions raised in this area included 1) how to address the problem that the cost of distribution of content is growing faster than the revenues gained from providing that distribution, 2) is there truth (or not) to the old hypothesis that on-net traffic is less expensive than off-net traffic? 3) is there a viable business model in being the “backbone” for either a network or a CDN? 4) is there a business model for ISPs to deploy CDNs, especially in the presence of Akamai?

Several integrating questions were discussed, without significant conclusions:

- Since the primary traffic problem seems to arise from video traffic, would it make sense to create a separate infrastructure for video?
- Is it feasible to consider an evolutionary path in which, first one “gets something up and running” and then later optimizes it? Experience suggests that the optimization never occurs.
- What is the role of regulation? In the US, interconnection is achieved through pairwise negotiating of consenting parties.

Response

This set of topics and questions confirm that the trajectory that is being taken jointly by the CFP and MITAS remains challenging and consistent with the stream of work that has followed from the earlier work on the Broadband Incentive Problem. To this end we will continue to concentrate on questions about characterizing Broadband traffic growth, developing a better understanding of usage-related costs, modeling likely futures for intercarrier interconnection, and the implications of video on both network architecture and traffic management and the role for CDNs in the ecosystem. We expect to continue and expand on studies in these and related areas.

Business Models for Privacy

MIT Coordinator: Karen Sollins

Summary

This discussion ranged over a number of topics. It began with the identification to two competing perspectives on the provision of privacy. On one hand, the provision of privacy incurs costs, has value, and incurs liability. On the other, it has appeared to be free in the past, so there are strong arguments for maintaining that status quo.

For simplicity here, we group the remaining discussion into four key topics: personal models, data issues, trust management, requirements for business opportunities.

- **Personal data:** the key question is whether and how to put the individual in control. This leads to technical, social, regulatory and legal challenges, in order to provide both personal control and confidence in such an approach including such challenges correction and deletion of information, while simultaneously allowing for effective economic models and legal control of the expectations of behavior of participating parties. It also exposes questions of (joint or partial) ownership of information
- **Data:** this discussion recognized an asymmetry because the utility and therefore value may be perceived differently. In addition, the context of data, such as being in isolation or in the context of other data, may make it more or less valuable, but the individual may have little or no control over that.
- **Trust management:** There were three key questions with respect to trust that were considered. The first is how to establish trust. The second is how to share and unshare, what that means, and how to have confidence that it occurs as desired. The third is how to evaluate trust; it is not just a Boolean, but what granularity is useful and whether values are ordinal or cardinal. In addition, there are related questions of composition and transitivity.
- **Requirements for business models for privacy:** it was recognized that some form of conflict of interest is necessary in order for there to be value to participants, so identifying those points of conflict are critical. In addition, there was a call for effective micropayment schemes (or at least one) in order to enable almost any business model. Finally, there was a suggestion that new models of revenue generation may be possible, for example in the contexts of new approaches to CDNs.

Two themes emerged from this discussion to move forward with respect to business models for privacy: an effective and usable approach to trust, and payment models, such as micropayments that will enable possibly new models of business opportunities.

Response

The Privacy and Security Working Group is currently working of focusing and revising its current agenda, from the broad topic of identity and privacy, to consider how best to examine and evaluate business models for privacy in identity management, and in particular the role of trust and a trust framework in this context. This effort is planned to begin with several specific case studies, probably in conjunction with the Value Chain Dynamics Working Group.

The Evolution of Media Content Business Models: Netflix and Ultraviolet Examples

MIT Coordinators: Charlie Fine, Andy Lippman, Natalie Klym

Summary

This session was introduced through two brief presentations. In the first, Charlie Fine discussed disruptive innovation, noting both its messiness and the challenge of being able to identify (and take advantage of) those disruptive moments. In the second introductory talk, Greg Thompson explained his view of the key factors to consider in the Netflix case. In his comments he focused on two primary events, the strong and effective start of Netflix and the timing of their decision to split their business based on delivery media, but reflected in separate business models as well. He noted that their largest challenge is licensing premium content and that their largest opportunity at present is internationalization.

The discussion covered a number of topics including: 1) a variety of licensing models, 2) a debate over the business model itself (rental vs. purchase): and 3) whether and how to tease apart the business models from the delivery models (in part because different delivery may have different value), the relationship between business models and customer demographics, and pricing more generally. The pricing discussion touched on questions of cost of production, economic and cultural differences, value to consumers, and a catalog of various approaches to how “fair” can be interpreted with respect to pricing.

The discussion concluded with recognition that increasing the number of intermediaries correlates negatively with being able to find a model that satisfies them all.

Response

The impact of this discussion is primarily in the work of the Value Chain Dynamics Working Group and the book on the future of video services that is underway. There are three primary topics on which this discussion will have an effect: 1) the future of delivery models (e.g., stored media vs streaming vs. download; renting vs. owning), 2) the future of content (i.e., premium vs. "short tail"; user generated vs. professional, the emergence of an original Web content industry), and 3) the Incumbent's Dilemma model being developed by Chintan Vaishnav, Sergey Naumov, and Charlie Fine, with Netflix as a case study.

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