

Measurement Lab: Overview and an Invitation to the Research Community

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ABSTRACT

Measurement Lab (M-Lab) is an open, distributed server platform for researchers to deploy active Internet measurement tools. The goal of M-Lab is to advance network research and empower the public with useful information about their broadband connections. By enhancing Internet transparency, M-Lab helps sustain a healthy, innovative Internet. This article describes M-Lab's objectives, administrative organization, software and hardware infrastructure. It also provides an overview of the currently available measurement tools and datasets, and invites the broader networking research community to participate in the project.

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General Terms: Experimentation, Performance

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1. INTRODUCTION

In 2008, Vint Cerf and others at Google initiated a broad discussion with networking researchers about major challenges in the effective study of broadband networks. Following this meeting, the New America Foundation's Open Technology Initiative (OTI) hosted a strategy convening where researchers identified several problems in this area, such as a lack of well-provisioned and well-connected measurement servers in geographically distributed areas. A second concern involved the difficulties in sharing large Internet measurement datasets between different research projects [1, 2, 3, 4]. Thirdly, decision-makers in Washington, DC were identifying the lack of broadband measurement data as a key limitation in their efforts to craft public policy. Through these discussions, Measurement Lab (M-Lab) was founded with an explicit objective to address the challenges identified by researchers and policy-makers.

M-Lab is an open, distributed server platform for researchers to deploy active Internet measurement tools, advance networking research, and empower the public with useful information about their broadband connections. By providing open access to M-Lab's data repositories to all interested parties, M-Lab helps sustain a healthy, innovative Internet. Since all data collected via M-Lab are made available to the broader research community, M-Lab is helping build a common pool of network measurement data, removing the need for every research project to collect its own data and facilitating cross-sample analyses that would not otherwise be possible.

M-Lab also provides a platform to develop, test, and deploy new active measurement tools. The M-Lab platform uses a large number of purpose-built and well-connected measurement servers in strategic locations around the globe. Each tool is allocated dedicated resources on the M-Lab platform to facilitate accurate measurements. Server-side tools are openly licensed to allow third-parties to develop their own client-side measurement software.

Since its launch in January 2009, researchers have used M-Lab to study a wide range of broadband connection characteristics. Network scientists have already developed and deployed multiple new tools that allow users to test their broadband connections by briefly communicating with M-Lab measurement servers. For example, one increasingly important aspect of a broadband user's experience is how network management practices deployed by Internet Service Providers (ISPs) differentiate among types of traffic (i.e., by prioritizing certain services or discriminating against specific applications). In addition, researchers use M-Lab to run in-depth diagnostic testing that helps identify whether a performance problem is caused by the network, the user's end-host, or an application. Results from these tests are both provided to the users who run these tests and aggregated within the M-Lab data repository to help identify trends.

Today, M-Lab is only at the beginning of its development. Six tools are currently available, running on 45 servers in 15 locations around the globe. As a collaboration, M-Lab depends on the active support of partners from the research community, companies that are willing to host M-Lab servers or data, and application providers that can integrate M-Lab measurements in their software. By the end of 2009, M-Lab partners included scientists from Internet2, the Max Planck Institute, the Georgia Institute of Technology, and many additional organizations; data and server hosting by Amazon, Voxel, and the Hellenic Telecommunications and Post Commission; and client software development by SamKnows, BitTorrent, Virginia Tech's Enterprise GIS Research and Development Administration, among others.

Founding partners Google Inc., the PlanetLab Consortium, and OTI collectively make up the steering committee that leads the development of the organizational policies and structure of the platform going forward. As part of the "proof of concept" launch of M-Lab, Google provides servers and network connectivity for the platform. The PlanetLab Consortium provides M-Lab's software environment and acts as a point of contact for network scientists.

