Broadly Available Broadband

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Broadband — commonly defined as Internet access that's always on and significantly faster than dial-up — has recently received considerable attention from the media. Policy makers, legal scholars, and CEOs have taken center stage, contributing their perspectives on the history, current state, and path forward for broadband, here in the US and around the world.

The Transformational Power of Broadband

The attention is well-deserved. Broadband is instrumental in social and economical development. Its importance is best grasped when considering it a general-purpose technology — one that enables new and different opportunities across an economy rather than addressing only one problem or sector.[1]

Businesses, education, healthcare — broadband is changing nearly every aspect of our society. Businesses can build on it to create entire new application and service areas such as advertising, e-commerce, online video, and social networking. Sophisticated service exports, such as call centers, knowledge-processing, and human resource processing firms, are becoming an increasingly important economic driver in developing countries.[2]

Broadband can also let the public sector access new communities and regions, and more efficiently deliver higher-quality services, including education, health, and paths for civic involvement. From preventive breast cancer screening and diagnosis in Mexico to maternal and newborn health support for rural hospitals in Mongolia, telemedicine applications can significantly improve health and medical outcomes, particularly for patients in remote areas and those with limited mobility (www.who.int/goe/en). The services and applications available over broadband can improve basic educational performance in math, science, and language skills. According to UNESCO, 61 million children of primary school age weren't in school in 2010, and an estimated 1.7 million extra teachers would be necessary to achieve universal primary education. Distance learning strategies can help nations bridge this gap. Broadband-based education programs could even become a source of income for higher education institutions that succeed in designing compelling, world-class curriculums tailored to the needs of the billions living in the developing world.[3]

The State of Broadband: Mind What You Measure

The good news is that broadband deployment is growing rapidly worldwide. Between 2006 and 2011, the number of countries with commercially available fixed broadband grew from 166 to 206 (www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx). This growth is partially fueled by the many national plans created to promote and characterize it. In the middle of the last economic crisis, many governments' stimulus packages included support for building broadband infrastructure and monitoring services. The number of national broadband plans and policies in the world has more than doubled since 2009. Public support can help roll out next-generation networks and provide short-term stimulus while laying the foundation for long-term growth. A frequently cited World Bank study found that a 10 percent increase in broadband penetration could yield a 1.38 (1.21) point increase in GDP for low/middle (high) income countries (http://go.worldbank.org/NATLOH7HV0).

Most of these plans state their goals primarily based on simple metrics such as geographic or population coverage by broadband services,

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typically defined in terms of download and upload rates. Of course, coverage is far from even, and there is much more to broadband service quality. Although the ITU estimates that roughly 2.5 billion people used the Internet in 2012, the set included only a quarter of people in the developing world (and a mere 6 percent in the least developed countries). In the US, a recent broadband progress report by the Federal Communications Commission states that 19 million Americans have only one option when buying fixed broadband Internet service. Wireless can help, but not always. Although 97.7 percent of the total US population in non-rural areas is covered by three or more mobile broadband providers, 1.3 million people lacked access to mobile broadband as of October 2012.[4] Out of curiosity, I looked for broadband advertised speeds in Coffeeville, Alabama, a town centerpiece of a 2011 *New York Times* article on broadband coverage.[5] Two years after the article, the Broadband Map (www.broadbandmap.gov) shows no wired provider in the area and only one of the two wireless providers offering services above the 1.5-Mbps threshold. Basic information on availability isn't enough to judge the state of broadband.[6]

In 2010, the FCC upgraded its broadband definition to include speeds of at least 4 Mbps for download and 1 Mbps for upload. The first generation of broadband included anything "faster than dial-up" — which, while incrementally improving user experiences, was insufficient to support the emergence of new, qualitatively different applications. However, a 2008 report from the US-based California Broadband Task Force estimated that basic telemedicine applications will require speeds between 10 and 100 Mbps, while high-definition telemedicine will require broadband speeds of more than 100 Mbps.[7] And download rate is not all. Although high download rates are necessary for moving large files and streaming content, synchronous communication applications such as video conferencing require high upload rates, and intermediate interactive cloud applications demand latencies below 160 milliseconds.[8]

We need to look beyond coverage and download speed and consider the classes of services available, and whether and how they're actually being used. The current wired and wireless infrastructure in most countries is insufficient to enable the

transformative changes broadband has promised. And then there is the issue of affordability. In developed countries, monthly broadband subscriptions represented just 1.7 percent of the average monthly gross national income (GNI) per capita. Comparatively, in less developed countries, a broadband subscription can cost well over 100 percent of monthly GNI per capita. The monthly price for a wired broadband connection in Ethiopia, Malawi, or Zimbabwe, for example, is more than 10 times the average monthly income. Even mobile-broadband services remain largely unaffordable in Africa, where the price of a computer-based plan with 1 Gbyte of data volume costs more than half the monthly GNI per capita.[9] Even available and affordable might not be sufficient, as a Pew Home Broadband study reports — one fifth of American adults don't use the Internet, and most of these non-users think online content isn't relevant to their lives and aren't confident they could use the Internet on their own.[10] As is pointed out elsewhere, "a focus on access alone fails to determine whether all members of a society actually benefit from broadband connectivity."[11]

Debates on the definition of broadband as a public utility aside, making sure that everyone has a high-capacity, low-latency connection for access to education, health, and economic opportunity — and can use it — isn't crazy talk,[12] but a forward-thinking goal for countries concerned with sustainable social and economic growth. Although challenging, given such rapidly evolving technology, identifying and collecting broadband metrics well-aligned with this goal can help us better focus our many efforts toward achieving it. This is an end for which computer scientists need to get into the act and become part of the conversation.

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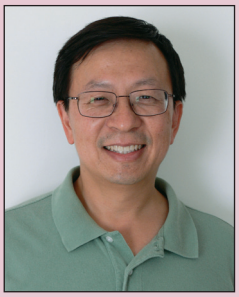

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