### **Concept Note: The Connectivity Lab**

**Edward G. Happ, August 2017**

**1. Purpose**

The purpose of this document is to propose creating an “Connectivity Lab” at UMSI that is focused on learning how to cope and solve problems in the sometimes-connected, 2G networks in developing countries. There are two aspects for this: basic communications with voice and data, and fit-for-purpose devices and applications.

**2. Background**

During meetings at universities in 2016, we’ve had an opportunity to discuss a number of projects undertaken at the International Federation of Red Cross and Red Crescent Societies (IFRC), Save the Children (STC) and at NetHope. These have been focused on connecting people and bringing technology out the last mile to the most challenged areas of the world in which nonprofits work. A Connectivity Lab could serve to raise consciousness among the next generation of students and technology entrepreneurs who have a keen interest in social impact work, whether from the for-profit or nonprofit side.

As Mark Zuckerberg at Facebook has recognized, building for the next billion people means sensitizing developers to the tech context of developing countries[[1]](#footnote-1). He initiated "2G Tuesdays" as a result. Each Tuesday for an hour, the Facebook campus network is switched off, and a 2G network turned up in its place. Getting work done is harder...and that's the point. Apps need to be smarter and leaner for the developing world's sometimes-connected Internet. And they need to run on more basic phones. That’s a positive design constraint.

**3. The Lab Functions**

Three functions for the Connectivity Lab would provide the potential starting points:

1. *Problem Solving in Crisis Situations* – For disaster relief organizations, the ability to communicate and solve problems in real-time is critical. Increasingly, citizens impacted by a disaster are part of the communication loop, both as first responders and decision-makers. Connecting with citizens and fieldworkers to coordinate efforts is part of modern disaster response programs.
2. *Lightweight App Testing* – In developing countries, most modern applications and devices simply do not work. Despite smartphone growth, most of the developing world still relies on basic “feature” phones[[2]](#footnote-2). Many of these lack a basic Internet connection, using instead voice and SMS text messaging for communications. Testing applications in this restricted infrastructure environment is critical to developing apps that work for the next billion people.
3. *Simulating on-the-ground IT contexts* – Like the Facebook example, it is possible to build a telecommunications environment that simulates real conditions in developing countries. With this “dial-a-context” feature, developers and nonprofit workers can immerse themselves in a test environment before deploying.

**4. The Audience**

The needs and potential may be segmented into four audiences:

1. *The university student population* is strongly interested in humanitarian and conservation work, and the use of personal technologies. However, they often lack the understanding of developing world contexts. Students can benefit from experiencing technology contexts in other cultures and solving realistic problems.
2. *International organizations* (like UN agencies, NetHope members, etc.) often run simulations for disaster response and other field operations. They can benefit from practicing in a safe and variable environment before deploying to actual crisis situations.
3. *Developers from corporations and other organizations*, need to be able to test equipment and apps in a telecommunications environment that is relevant to developing countries. Being able to simulate user experience an important benefit.
4. *Additional audiences* – these include researchers, military and domestic response organizations.

**5. The Proposal – the Connectivity Lab**

Creating a lab at a major university’s school of information technology is a natural fit, both in terms of a focused interest area among faculty and students, and as a service to the nonprofit and for-profit sectors. Students in each of the IT and Business-related schools would be an important partner for creating the lab, staffing it, analyzing the results and presenting it to the audiences. Finally, such a center would help build the brand of a school that sees itself at the intersection of people, information and technology.

What we propose are at least two labs, one in each of two universities, schools or on either end of a campus; where the connection to the outside world and each other is limited to a flaky 2G connection. Two teams will be assigned a problem to solve collaboratively between the two locations. Smart phones need not apply.

We will approach the network technology companies, like Cisco and Ericsson, as well as the technology companies with strong initiatives to connect emerging populations, like Microsoft, Google and Facebook, to help us build this bimodal lab so that information services, computer science, engineering and business students can learn to solve problems where the on-line tools we take for granted simply do not work.

The lab will also have the capability to simulate a rural or urban setting in a developing country, as well as a disaster response context. Ideally, the lab administrators will be able to pick a country, rural or urban setting, and “dial the context,” where the network will be automatically configured to simulate actual conditions in that country.

The lab will be outfitted for student teams to problems solve assigned cases that will be developed from the experience of international organizations like the members of NetHope[[3]](#footnote-3).

Sample problem-solving tasks can include the following:

1. Assess needs, find goods, arrange rapid deployment of people and supplies (supply chain case).
2. Assess the technology context. Learn techniques and develop tools to rapidly assess the voice and data communications available following a disaster or crisis.
3. Find the gurus. Person scavenger hunt at WHO, IFRC, Universities, etc. Find 3 groups; assemble a team and hold an on-line meeting to plan deployment.
4. Situation awareness exercises: solve situation awareness problems, assess needs and establish communication between field responders and HQ

Some potential phases for this initiative include:

1. Phase One – provide the basic lab for simulating telecommunication constraints in disaster scenarios for the new Crisis Informatics course; create the crisis immersion experience for students
2. Phase Two – create a second lab to simulate problem solving between headquarters’ and field teams during various stages of a disaster response
3. Phase Three – add the dial-a-context technology to simulate rural and urban telecommunications scenarios by country
4. Phase Four – provide a test bed for devices and apps to fill emerging country audience needs

**6. Next Steps**

The following steps should be considered:

1. Gauging the interest among faculty, students and technology companies for such a lab
2. Determining estimated costs and funding opportunities
3. Hiring/appointing the director for the lab
4. Convening the right combination of (a) CIOs/IT managers, (b) large non-profits, (3) technology corporations, and others to contribute expertise and cases.
5. Discussing issues of technical feasibility and simulation limitations.

**7. For further Information, please contact:**

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**Annex 1 – Facebook Case Study**

"Facebook is launching a new initiative called "2G Tuesdays" that will give all employees an opportunity to see what using the app with an incredibly slow connection feels like and help close the "empathy gap" between Silicon Valley and emerging markets.  For most people, the stark differences will likely be jarring." --Jillian D'Onfro, *Business Insider,* Oct. 27, 2015,

<http://www.businessinsider.com/facebook-2g-tuesdays-to-slow-employee-internet-speeds-down-2015-10>

"In an attempt to understand the millions of people in emerging markets who only have access to slow internet connections, Facebook is adopting a new opt-in initiative [called "2G Tuesdays."](http://blogs.wsj.com/digits/2015/10/27/facebook-slows-the-internet-for-staffers-on-2g-tuesdays/) Facebook employees logging into the company's app on Tuesday mornings will be able to switch to a simulated 2G connection for an hour, making profiles, pages, photos, and videos load slower than they usually do on the 3G and 4G connections nearly ubiquitous in the United States."*By*[*Rich McCormick*](http://www.theverge.com/users/Rich%20McCormick)*,* "The Verge" , October 28, 2015, <http://www.theverge.com/2015/10/28/9625062/facebook-2g-tuesdays-slow-internet-developing-world>

"In June,[Facebook launched a lightweight version of its app](http://blogs.wsj.com/digits/2015/06/04/facebook-launches-lightweight-app-for-emerging-markets/), Facebook Lite, for users in regions with limited bandwidth.

“People are coming online at a staggering rate in emerging markets and in most cases are doing so on mobile via 2G connections. But on the lower end of 2G networks, it can take about two minutes to download a web page. We need to understand how people use Facebook in different Internet connections in all parts of the world so we can build the best experience for them,” said a Facebook spokeswoman."  --GEORGIA WELLS, "Facebook Slows the Internet for Staffers on ’2G Tuesdays’", Wall Street Journal, Oct 27, 2015,

<http://blogs.wsj.com/digits/2015/10/27/facebook-slows-the-internet-for-staffers-on-2g-tuesdays/>

Facebook’s postings on 2G Tuesdays:



[MOBILE](https://code.facebook.com/posts/mobile/) · [CULTURE](https://code.facebook.com/posts/culture/) · [PERFORMANCE](https://code.facebook.com/posts/performance/) · [TESTING](https://code.facebook.com/posts/testing/) · [NETWORKING AND TRAFFIC](https://code.facebook.com/posts/networking/)

Chris Marra, "Building for emerging markets: The story behind 2G Tuesdays," October 27, 2015

<https://code.facebook.com/posts/1556407321275493/building-for-emerging-markets-the-story-behind-2g-tuesdays/>

"People are coming online at a fast rate in emerging markets. In most cases, they are doing so on mobile via 2G connections. But on a typical 2G network, it can take several minutes to download a webpage. That doesn't make for a great experience when sharing content with friends and family. To build for a global audience like ours, we know that we need to design features that work seamlessly even on a 2G network.

"We’re always developing tools and systems to address this. Earlier this year we released [**Connection Class**](https://code.facebook.com/posts/952628711437136/classes-performance-and-network-segmentation-on-android/), which helps you smartly segment based on network performance in real time. We also built a tool to simulate network conditions, called [**Augmented Traffic Control**](https://code.facebook.com/posts/1561127100804165/augmented-traffic-control-a-tool-to-simulate-network-conditions/).

"While both of these tools are useful for developers looking to simulate and account for slow network conditions, they don't solve for everyday decision-making around how a product should function or look. Today we're taking another step toward better understanding by implementing “2G Tuesdays” for Facebook employees. On Tuesdays, employees will get a pop-up that gives them the option to simulate a 2G connection. We hope this will help us understand how people with 2G connectivity use our product, so we can address issues and pain points in future builds.

"Today's effort was born in a conference room. Our team was discussing what it would take to bring Augmented Traffic Control directly into the app so people could test network conditions no matter where they are. One person asked whether we thought the work would be effective — would people actually use it? A team member suggested that we just start opting people into a 2G experience on a certain day of the week; another quickly suggested the pithy name, and then we got to work. Giving employees a seamless way to empathize with the people using Facebook on networks like this brings us a step closer to helping everyone use our product in a quick and seamless way.

"Happy 2G Tuesday!"

<https://code.facebook.com/posts/1561127100804165/augmented-traffic-control-a-tool-to-simulate-network-conditions/>

1. See Annex 1 for notes on Facebook’s 2G Tuesday program. [↑](#footnote-ref-1)
2. See the GSMA 2015 report on “The Mobile Economy”, especially the chart on p.14 for details on the mobile gap: <https://www.gsmaintelligence.com/research/?file=08bd184710b7e671e80cfe6693cead2d&download> [↑](#footnote-ref-2)
3. As the Co-founder and a Leadership Fellow for NetHope, I am in a unique position to make this happen. [↑](#footnote-ref-3)