

mPhone: Asynchronous Messages for Developing Regions

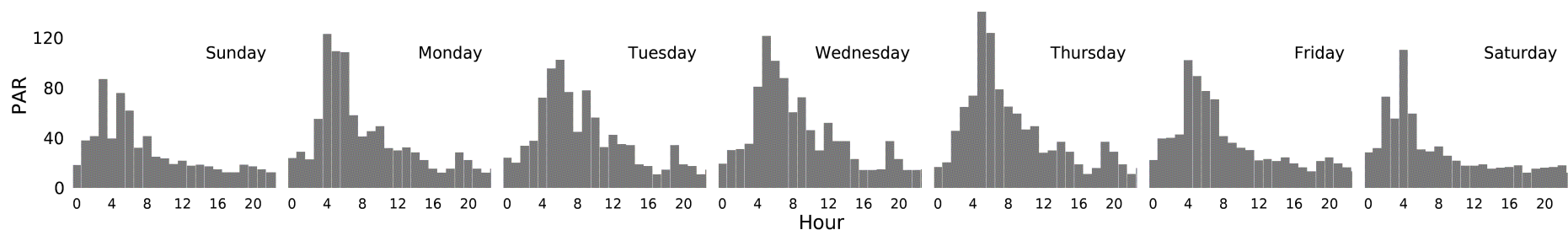
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Asynchrony

- Messages rather than direct communications
 - Email vs Phone Call
- Why Asynchrony?
 - Advantages for providers
 - Advantages for users

Provider Advantages

- Networks currently wildly over provisioned
 - They have to provision for *peak* rather than *average* usage.
 - This means that most of the time, there's a ton of wasted resources



Provider Advantages, cont

- Ok, so how does asynchrony help?
 - If the messages are asynchronous, we can delay communication until the network is free.
 - This allows us to provision for *average* case!
 - This means better utilization of existing equipment
 - Scaling to new users
 - Also means it's cheaper to install new infrastructure
 - Less peak demand, as we're provisioning more intelligently

User Advantages

- Extended operating range
 - Users in rural areas travel a lot
 - This may be into and out of coverage (fields, for example)
 - Coverage is generally concentrated around population centers. Intermittent coverage in the "fringe" outside of these areas.
 - Asynchrony allows a user to communicate even outside of network coverage
 - Send a message out of coverage, push it to the network when you gain connectivity.

User Advantages, cont

- Cost benefits
 - Direct calls can be very expensive
 - ~\$0.20 per minute in Uganda, on MTN.
 - As evidenced before, providers will get benefits from moving their users to asynchronous communication
 - Presumably, the providers will pass these gains onto the consumer by allowing for low cost asynchronous communication

Design & Implementation

- Voice messages!
 - Few of the usability issues of SMS
 - All of the asynchrony benefits of message systems
- mPhone
 - Asynchronous message platform
 - Send voice/text to other mPhones, traditional telephones, email addresses
 - Receive messages from these sources as well
 - Store messages locally allowing for asynchrony gains

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Sindika Message Message zo (2) Amanyanya

Erinya 3:3

Enamba Sangula Kuba Simu

Number Empya

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Sindika Message Message zo (2) Amanyanya

Amalobozi Messegi

Ebikwata Ku Bwokola Elinda

Likodinga Lekerawo Saako Ssindika

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Sindika Message Message zo (2) Amanyanya

From:2 Type:wave

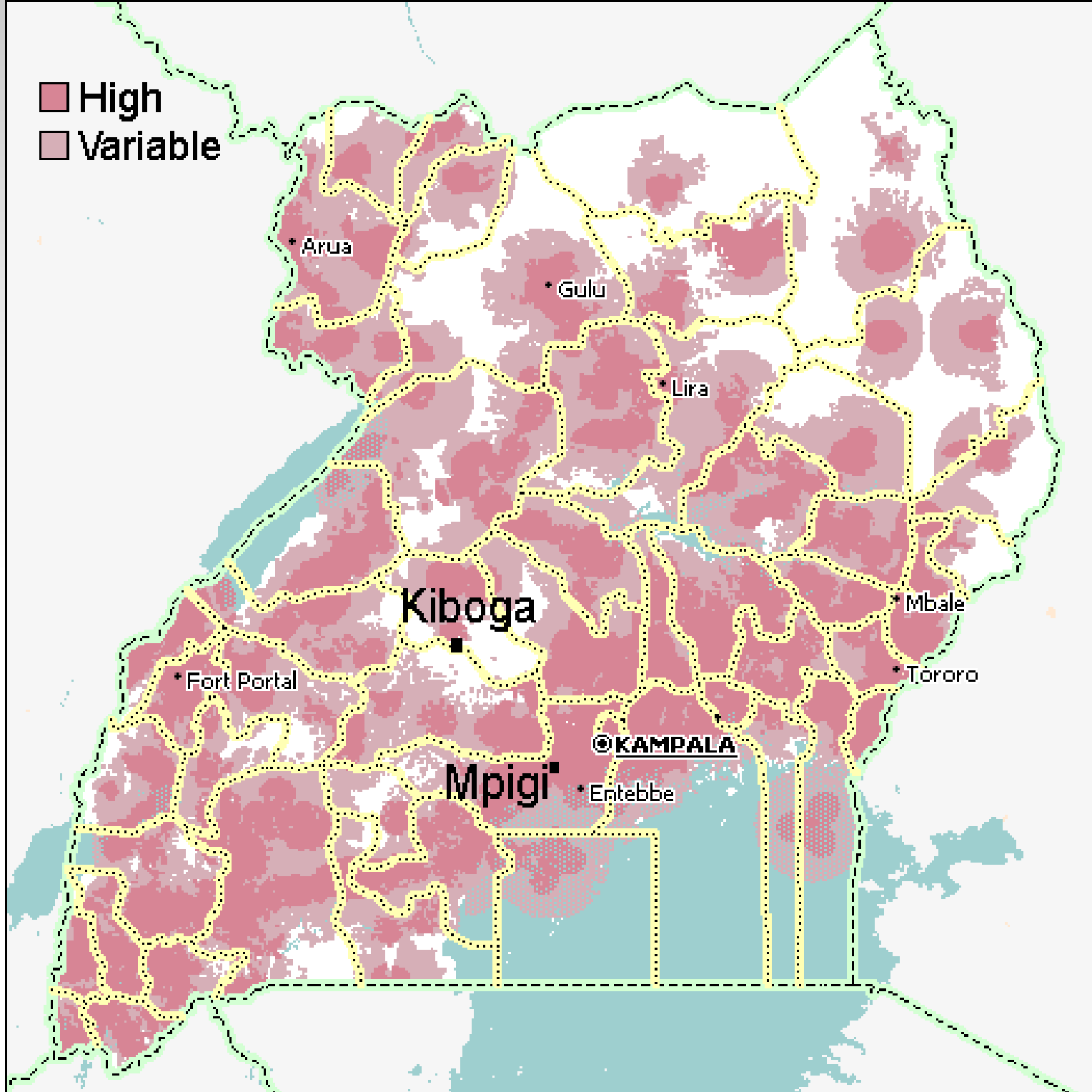
4.425 Seconds

Saako Lekerawo Sangula Ddamu

Deployment

- Summer 2008, Uganda
- Aim to test usability in villages with intermittent cellular coverage and without any coverage
- Two rural trading areas
 - Mpigi: 1 Hour from Kampala
 - 1 Disconnected Village, 3 Intermittent Villages
 - Kiboga: 3 Hours north of Kampala
 - 1 Disconnected Village, 5 Intermittent Villages
- Surprisingly easy to find areas with challenged networks

■ High
■ Variable



Results

- Users hate SMS
 - Literacy, usability, reliability
 - Isn't *true* asynchrony: messages generally not stored on phone
 - Still commonly used
 - Price primary reason: Cheap!
 - Granularity of Communications
 - Able to budget SMS more effectively than direct calls
- Users love Voice Messages
 - Usability is much better than SMS
 - "It's a lot like direct calling, we're talking"

Results, cont

- Users can understand range extension
 - They currently use asynchrony to deal with the *receiver's* disconnection
 - Send SMS when the other user is unavailable
- Even higher granularity of communications
 - Users preferred per-second rather than per-message pricing
- Voice messages are of great value in the developing world.
 - Almost all users would prefer voice messages to SMS if price competitive.

Future Work

- We've demonstrated that users get an advantage out of asynchrony.
- Now, we need to demonstrate that providers do.
 - Create a small GSM station deployment
 - Show that messages allow us greater utilization of the hardware
 - Figure out what "price competitive" is

Questions?