

FiberAfrica

New Model for Connectivity for All

Dr. Rahul Tongia

Carnegie Mellon University, USA

School of Computer Science / Dept. of Engineering &
Public Policy

CSTEP, India



Vision

- ✦ The Internet can be made **available**, **accessible**, and **affordable** through a new design based on *open-access* models and a leapfrog design combining optical fibers and fixed/portable wireless
- ✦ Treating the raw infrastructure as a public good (like roads), there can be competition for services to be provided by service providers and entrepreneurs



Why is Connectivity Expensive?

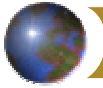
- ✦ Design?
 - ▣ Choice of technologies
 - ▣ Scale
- ✦ Policy?
 - ▣ Add-ons to the lowest cost solution
- ✦ Failure of markets?
 - ▣ Real competition needs 3 providers

- ✦ India and China are rolling out broadband for \$5-8/month



Proposal

- ✦ The vision is articulated in a concept dubbed “FiberAfrica”
 - ▣ The majority of the population can get nearby access to broadband for a one-time capital expenditure of ~\$1-1.5/capita
 - Can be cheaper by harnessing any existing infrastructure
 - Includes optical fiber of virtually unlimited capacity between major population centers, and broadband wireless hubs for wide-spread access over large areas
 - ▣ Revolutionary business model could allow virtually free access to schools and rural community centers



FiberAfrica

- ✦ A design to provide the majority of Africans broadband in walking/cycling distance
 - ▣ One time capital expense ~\$1/person
 - Excludes end-user equipment, like receiver modems, computers, etc., which is a distributed cost
 - ▣ Hybrid of optical fibers and fixed wireless

✦ More details are at:

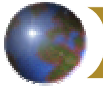
http://www.contrib.andrew.cmu.edu/~tongia/FiberAfrica--ending_a_digital_divide.pdf



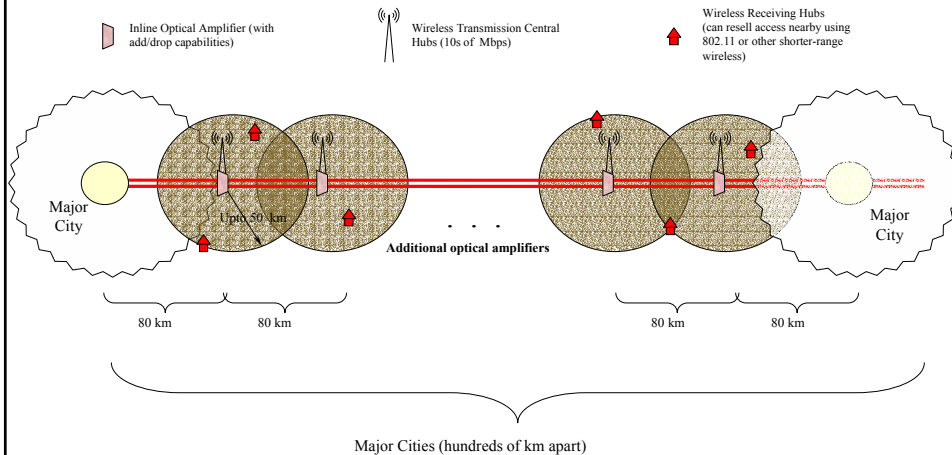
Africa's Backbone Network

- Almost 70,000 km core backbone
 - DWDM Technology for scalability and cost-effectiveness
- 35,000 km spurs (not shown)
- Routing chosen to provide maximum coverage
 - Can leverage existing fibers and rights of way (along highways)





Design

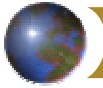


Detailed design undertaken, for all capital and operating expenses



Why this model?

- ☛ Appropriate scale – into the rural areas
- ☛ Optical fibers make it “future-proof”
 - ☒ One time cost leads to fiber infrastructure that can last decades
 - ☒ Capital costs much lower than conventional wisdom – few thousand \$/km MAXIMUM
- ☛ Increases access and domestic usage – which is not addressed merely by having an international fiber link
- ☛ Removes the connectivity Digital Divide
- ☛ Business model is sustainable
 - ☒ Public-Private partnership
 - ☒ Synergistic with mobile providers – who lack such capacity for broadband
 - ☒ Almost no barrier to entry for casual users (through schools and community access points)



Open Access / FiberAfrica

Underpinnings

- ✿ Infrastructure disconnect
 - ▣ Fiber lasts 30+ years, electronics needs to be amortized in 5-7 years
- ✿ No real conflict with competition
 - ▣ Focus on rural and “uneconomic” areas
 - ▣ ISPs would also benefit
- ✿ Can justify “special regulation” only for the public good
 - ▣ Would also attract grants and soft loans



Issues

- ✿ The techno-economics are sound...
- ✿ ...What are required are **appropriate policies**
 - ▣ Traditional business as usual (trickle-down) approaches
 - Are more expensive
 - Do not reach most users
 - Have not proven to be superior
- ✿ Vested interests, who like the status quo, may complain
- ✿ This model helps all citizens, and not a private operator, so it can be justified
 - ▣ Special policies are enacted for the public portion of the network only – no conflicts of interest



Needed governmental support

- ✿ Need to change conventional wisdom on how to do networks
- ✿ Must take steps to keep costs as low as technologically possible
 - ▣ Removing additional add-on costs
 - Waiver of surcharges and rights of way
 - Otherwise, simply raises costs for consumers
 - Revenue share model instead can keep this neutral for the government
 - ▣ Opening up broadband, including intl. connectivity
 - Discussions underway with global providers for much better links and low prices
 - ▣ Releasing appropriate (unlicensed) spectrum
 - ▣ Etc.



Next Steps

- ✿ Detailed analysis
 - ▣ Carnegie Mellon has already undertaken extensive modeling using GIS and real world networking experience
- ✿ Building up partnerships
 - ▣ Engineering and Construction
 - ▣ Operations
 - ▣ International
 - ▣ Content
- ✿ Securing funding
 - ▣ With the right policies (open access and development focus), grant funding can be obtained for much of the costs, and/or soft loans
- ✿ Test Deployments

If existing fiber can be used, can light up first segment within a year, at *very* low cost



Reality Check

- ✿ This will not happen overnight
- ✿ It needs to incorporate if not leverage existing infrastructure and stakeholders
- ✿ Should begin with one or more countries as a “real-world” proof of concept

THANK YOU