The Global Village

Paul Mitchell
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The Global Divide

Countries with % connections to Akamai >4Mb/s

6 billion mobile subscriptions globally*

Only 25% of homes in developing countries have computers*

In many developing countries the cost of access exceeds the average monthly income*

Language divide: 6,000 languages globally, only 500 localized languages*

Internet accounts for one fith of all GDP growth in G8 countries*

### Impact of technology on poverty

A PC + Internet bundle creates an average of **95k USD per capita** in estimated economic and social impact over the course of student lifetime in Peru.

<table>
<thead>
<tr>
<th>YES</th>
<th>+6-8% secondary school graduation rate</th>
<th>40% pursue post-secondary education</th>
<th>Graduates from college/university &amp; receives higher salary</th>
<th>Average lifetime earnings of 459,973 USD or more</th>
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<tbody>
<tr>
<td>Access to PC + Internet at home?</td>
<td>Increase earning potential</td>
<td>Make 10,454 USD on average</td>
<td>Likely to develop health issues, supp. income, etc</td>
<td>95,232 USD average per capita difference</td>
</tr>
<tr>
<td>NO</td>
<td>+6-8% secondary school drop out rate</td>
<td>Work lower wage unskilled jobs; risk for social disengagement</td>
<td>Increased likelihood of dependency on social resources</td>
<td>Average lifetime earnings of 185,201 or less + consumption of resources</td>
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</tbody>
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Arnold Group Economic Impact Analysis for Microsoft, © 2012
Improved social impact

By targeting students in poverty

$\textbf{>36B USD}$

in total economic and social impact can potentially be realized in Peru

- E-Gov: $103M
- Healthcare Benefits: $1,554M
- Prison Savings: $148M
- Social Savings: $2,238M
- Tax: $5,989M
- Earnings: $26,140M
What about those without?
Most spectrum in most places is unused most of the time.

Today's allocation system based on a 100 year old model optimized to avoid interference.

Dynamic access technologies can yield a substantial increase in available spectrum.

TV White Spaces is only the beginning!
More connected objects than people ...

The internet of things

50 billion by 2020

Spectrum is the oxygen of a digital world
Wi-Fi Impact after 10 years

2002
Wi-Fi Alliance Founded

2012
439 million homes using Wi-Fi router

2016
800 million homes projected to deploy Wi-Fi

Source: Strategy Analytics

85% penetration in homes with fixed broadband

$46 - $87 billion of consumer surplus each year

Maintains 49 – 101 million fixed broadband subscriptions

Unlicensed WiFi is a critical part of our broadband infrastructure
White Spaces

Devices can successfully co-exist with broadcasters and other licensees

Could be used for a variety of applications

The trial participation and attention evidences growing industry interest and readiness

This and other trial results will aid regulatory decisions around the world

Cambridge – Key Conclusions
Through the Trees, Over the Water, and Into the Homes

TV White Spaces Commercial Pilots Begin in Singapore

Smart Radio for a Smarter City
Over the Water

Area Of Coverage for the High-Speed Marine Wi-Fi
TVWS – From Concept to Commercialization

1. R&D
   - Basic research
   - Lab trials

2. Regulatory Trials
   - Technology feasibility
   - Prototype devices
   - Field test & measurements

3. Commercial Pilots
   - Device & database certification
   - Use case experimentation
   - Vertical industries

4. Commercial Deployments
   - Volume devices
   - Rural broadband
   - Campus networking
   - Smaller form factors
   - Standards-based devices

Pilot Group

Institutions:
- Federal Communications Commission (FCC)
- Ofcom
- iDA (Singapore)
- Microsoft Research
- A*STAR (Singapore)
Momentum is increasing!
## Standards Efforts

<table>
<thead>
<tr>
<th>Standards Body</th>
<th>Issue</th>
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<tbody>
<tr>
<td>Wi-fi Alliance</td>
<td>White spaces device interoperability and certification program</td>
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</tbody>
</table>
| **IEEE**       | 802.11AF wireless local area network TV Band channelization  
802.11AC non-contiguous channel bonding for wireless local area networks  
801.19 coexistence of technologies  
802.22 higher powered Wide Area Networks  
1900.6 spectrum sensing  
802.15 TG4M low rate WPAN |
| IETF           | PAWS WG database to device interface |
| ETSI BRAN      | WSD to WSDB interface standards and radio interface standards |
| European conference of postal and telecommunications administrations (CEPT) SE43 work group | White Spaces implementation  
Cognitive radio systems 470-790 MHz |
<p>| U.S. Database Administrators Group | Database to database interoperability |</p>
<table>
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<th>Summary</th>
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<td>The technology is real and works.</td>
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<td>The ecosystem is ramping up quickly.</td>
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<td>Policymakers should explore new models for spectrum allocation and regulation.</td>
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<tr>
<td>Results are only limited by imagination.</td>
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